PAPERS

IN

AGRICULTURE.

AGRICULTURE.

THE GOLD MEDAL of the Society was this Session presented to the Right Honourable the EARL of FIFE, for his PLANTATIONS of FOREST-TREES, and other Agricultural Improvements in North Britain; from whom the following ACCOUNTS and CERTIFICATES were received.

SIR,

HAVING been desired by the Society for the Encouragement of Arts, &c. to communicate to them the progress of my plantations, for which I had the honour to receive their GOLD MEDAL, together with my improvements and new plantations, since the date of my last letter; I now send you a full

account of the whole, signed by the planters on the different estates where the improvements have been made.

Duff-House Park.

IN addition to this Park, I have made a new road, extending two miles from one of the park-gates to the turnpike-road. This new road passes through a plantation of twenty acres about twenty-two years old; and in all other places there are belts on each side of the road. I have carried it over highways by bridges, so that I can now ride from the gate at the turnpike to Duff-House, a distance of seven miles, without opening a gate. Nothing can be more beautiful than the drive through these woods, from the prosperous state of the trees, and great variety of colour, especially in the month of October.

It

It is a curious circumstance that there are in this Park part of the counties of Aberdeen and Banff, and five parishes.

Report to the Earl of Fife, of Trees planted in the Duff-House Park, and different Inclosures and Clumps on the Sides of the Turnpike-Road, amounting to Sixty Acres, besides the Belts on the Sides of the New Road, since the Year 1797.

	Larch	Ash	Oak	Alder	Beech	Birch	Popl.	Elms
Planted an. 1797	1000	1000	1000	1000	1500	1000	600	1500
1798	800	600	1000	800	800	1000	400	700
1799	1000	800	800	1000	700	800	400	1000
1800	1000	500	1000	800	400	800	500	800
1801	15000	100	1100	1200	600	1300	300	1000
	18800	3000	4900	4900	4000	4900	2200	5000

The belts on the sides of the new road, with different clumps amounting to 40 acres, were planted, the greater part of them in 1802, and will be all finished in the spring of 1803. There are already planted, 20,000 Larch, 5000 Firs, 3000 Ash, 2000 Elms, 200 Horse Chesnuts, 300 Sycamores, 5000 Oaks, 200 Birch, 200 Alders. Total 100 acres, and 85,500 Trees.

All your Lordship's plantations under my care, are in the most prosperous state.

JOHN GEDDES,
Planter.

Duff-House,
Dec. 1, 1802.

Delgaty Castle.

I HAVE had planted on this estate since the year 1799, 114 acres as you now will observe by the report of my planter.

By the indiscretion of a neighbouring farmer burning furze near one of my plantations, it was set on fire, and 20 acres of thriving wood, which had been twelve years planted, were entirely consumed. I took out of other plantations, where they were too thick, about 500 Larches, with the turf and ball of earth

earth about the root. By transplanting them in this manner, in wet weather, few of them go back. I trenched different clumps through this burnt plantation, and all the intermediate spaces I filled up with Larches, Oaks, Birch, Ash, &c. from two to three years old. These, from the ashes and rubbish that fell from the burnt wood, are in a very thriving state. On the side of this plantation next the highway, I trenched a belt, and planted it and the clumps with Ash, Oak, Beech, Sycamore, &c. from four to five feet high; these answer for transplanting.

The turnpike-road from Turiff to Banff passes through this estate. At a little distance from the road, there are several rising grounds on each side; and as good farming is the greatest ornament to a country, I have taken care that as much of those grounds as was likely to be profitable to the farmer should be im-

proved; but such of them as are unfit for agriculture, and of almost no consequence as pasture, I have planted; and in a few years they will be an ornament to the road, and take away from the bleak appearance of the country. Improved farming may be said to be little more than in its infancy in that part of the country; but as the leases expire, I always give the preference to a spirited and improving tenant. I also take some of the young men, either to my own farms, or send them to different parts of the kingdom, where farming is carried on after the most improved plan, and, according to the character they bring me from the farmer they have been studying under, I not only give them farms on reasonable terms, but also allowances for building and inclosing, in order that these farms may be in a profitable and comfortable state.

An Account of the Plantations on the Earl of Fife's Estate of Delgaty, since the Year 1799.

	Larch	Firs	Oaks	Birch	Beech	Mount Ash
In an Inclosure of 50 Acres, anno 1800	34,000	20,000	5,500	16,000	1500	1000
In two Inclosures 60 Acres each, 1801	28,000	25,000	7,000	22,000	1000	1500
In 110 Acres	62,000	45,000	12,500	38,000	2500	2500

The bank on the south side of Turiff, four acres, mostly trenched, and planted with 500 Ashes, 600 Oaks, 300 Elms, 500 Sycamores, 200 Norway Maples, 200 Spruce Firs, 300 Mountain Ashes, 200 Silver Firs, 600 Larch, 200 Alders, and 300 Poplars. There were planted, besides, nearly 6000 Ashes, Elms, Beech, Sycamore, &c. along the sides of the turnpike-road, and in clumps where by-roads strike off from it. Total 114 Acres, and 172,400 Trees.

These and all the other plantations are in a very thriving state.

ALEX. CHESHALSNE, Planter.

Delgaty Castle,
Dec. 6th, 1802.

Report of Plantations on the Earl of Fife's Estates in the Parishes of Rothiemay, Keith, and Grange, since the Year 1797.

	Larch	Oaks	Elms	Beech	Firs	Birch	Ash	Alders	Sycamores	Poplars	Spruce Firs	Mount. Ash	Norwich Maples	Chesnuts	Limes	Pine-aster
Carskellie, 97 Acres, planted in 1798 with -	40,000	15,000	20,000	15,000	16,000	12,000	8,000	4,000	3,000	2,500	1,000	1,000	1,000	2,000	1,000	500
Ballock-Hill, 400 Acres, 1799, with -	200,000	30,000	30,000	50,000	144,000	60,000	45,000	10,000	6,000	20,000	5,000	5,000	5,000	16,000	Bhoans 10,000	Different species of Willows 5,000
Scraib-Hill, 130 Acres, 1800, with	85,000	20,000	7,000	5,500	40,000	8,000	12,000	3,200	2,000	2,000	Laburnums 2,000	2,000	1,000	2,000	1,000	3,000
Turtory, 33 Acres 1801 -	18,000	5,000	3,000	2,000	5,000	8,000	6,000	3,000	1,000	2,000	500	600				
Manoch-Hill, 4 Acres, 1802	2,000	1,000	500	500		1,000					500	500				
Bridge of Isla, 4 Acres, 1802 -	2,500	900	700	400	600	950	600			300				Lord Fife's Mount. Ash		
Wood Side, 1 Acre, 1802 -	300	200	200	90		50		60		50	20	70	50	30		200
	347,800	72,100	70,400	73,490	205,600	90,000	71,600	20,260	12,000	26,850	9,020	9,080	7,050	20,030	12,000	8,700

There have likewise been planted nearly 2000 Ash, Elm, Sycamore, Mountain Ash, and Oaks, from 4 to 5 feet high, along the side of a natural wood that borders on the highway.

In addition to the plantation on the hill of Inchorsie, including the belts on the side of the road leading to Rothiemay, $4\frac{1}{2}$ acres with

Larch,	Beech,	Birch,	Firs,	Mountain Ash,	Poplars,	Elms,
2500	1000	1000	1000	100	100	200

The greater part of the belt is trenched. Total $673\frac{1}{2}$ acres, and 4,063,880 trees.

All your Lordship's plantations under my inspection are very thriving.

JOHN CHISHOLM,
Planter.

Mar

Mar Lodge.

AT this place, which is in the County of Aberdeen, I have inclosed 300 Acres with a fence sufficient to defend it from sheep or cattle, and planted 2000 Larches through different parts of it, merely as a mixture for the wood spontaneously produced. This inclosure having been protected from sheep, &c. for a few years past, is now full of thriving firs, birch, poplars, and mountain ash.

The scenery of this country is as beautiful and picturesque as lofty hills, covered with fine old wood, stupendous rocks, and a fine river, can make it. I have erected five bridges over the rivers with perfectly good roads, that it may be accessible to any stranger who may wish to visit it.

It is not easy to determine how these very old woods have originated. Many of

of the trees are six feet in diameter; and they are far more durable than foreign wood, of which the country has been convinced by experience. Last summer a bridge was erected over the Dee, for a new line of turnpike to the north of Aberdeen. The span of the principal arch is one hundred feet.

Though the distance from the sea-port of Aberdeen, where foreign wood is imported, is not above six miles, the directors of this work were so conscious of the superiority of the wood in my forest in Mar to foreign wood, that they had it brought by land-carriage above a hundred miles, though the roads were in many places very bad.

The source of the Dee is about 100 miles above Mar Forest, and falls into the German Sea at Aberdeen. The channel of this river might, at a very inconsiderable expence, be so cleared as to admit the floating of timbers. I should

should with great pleasure (and have proposed to do so to the other Proprietors) be at the expence of clearing it as far as my property extends, which is above fourteen miles below the forest. But until the Under-Proprietors do the same, it would be of no consequence. I hope, however, they will soon see the advantage to the country of doing so.

Innes-House, December 6, 1802.

THE greater part of the waste grounds on my property, in the county of Moray, has been planted prior to 1797, as will appear by my letters to the Society. The following is the report of my Planter:

Report

Report to the Earl of Fife, of Plantations in the County of Moray, on his Lordship's Estates, since 1797.

	Larch	Mount Ash	Birch	Beech	Firs	Ash	Elms	Alder	Popl.
Planted in 1797,									
7½ Acres -	2000	100	230	120	6,000	220	100	50	
1798, 1 Acre	900	140		100		120			
1799, 16 Acres	1000	230			22,000				
1800, ——	600								
1801, 1½ Acre	600		140	130		1120	100		
1802, 1 Acre		130		140	1,000	500	110	150	100
	5100	600	370	490	29,000	1960	310	200	100

There were also planted a mile and a half of a trenched belt, between Inneshouse and Leuchers, with larch and hard wood, about 3000 plants.

Total, 27 acres, and 41,130 trees. All your Lordship's plantations are very thriving.

JOHN TRIG, Planter.

The county of Moray, both for climate and soil, is equal, if not superior, to most parts of Scotland. I was therefore very anxious that the best mode of farming

farming might be pursued, by giving allowances to farmers for good farm-houses, inclosing, &c. I flatter myself that whoever now visits that country, will see that I have, in a great measure, accomplished my purpose, by the spirited industry of the farmers.

There was a moss of 115 acres, which was a very disagreeable object. I could not improve it, although it was my property, as there was an estate in the neighbourhood, which had a right of taking turf and peat from it. All I could do was to conceal it as much as possible by a belt of planting. This was done about twenty years ago, and the belt is now very valuable. In the year 1799, I purchased the estate that held the above right. I immediately drained the moss at a moderate expense; and covered it over with sand found in the neighbourhood, which has evident marks of being left there by the sea, there being many particles of sea-shell

shell and marl in it, to the depth of three or four inches, and it is now one of the finest fields in that country.

The mosses in general are large wastes covered with heath. Tradition says they were large woods consumed by fire; thus much is certain, that in digging for peat, at the depth of five or six feet, large trees of Oak and Fir are found. The peat from these mosses has little or no smell.

The moss I drained was, to all appearance, a green meadow, and what they call in that country a green moss. The peat and turf were dug out of holes all over it. These soon filled with water, and so great was the growth in five or six years, that they were again in a state that peat and turf might be cast again. The fuel taken from this moss had so strong a sulphureous smell, that it was a nuisance to come near the houses where it was burnt, and the wearing-apparel and furniture were equally bad. Notwithstanding

standing this apparently disagreeable property, the tenants were so much attached to this kind of firing, that I was obliged to give a part of it to those who had a few years to run of their leases. This was not from necessity, as the farthest off of those were not three miles from a sea-port, where they could get coals on reasonable terms, and the country now abounds in wood.

There was likewise a lake, which I was prevented from draining for the same reasons.

The progress of draining this lake you will observe in the following letter, transmitted to me by my tenant Mr. Wm. Young, which I take the liberty of laying before the Society. He is a young man who deserves much praise, for his improvements in agriculture, and the ingenuity which he has displayed in various branches of Arts and Commerce.

Inch-

Inchbroom, near Elgin, 1st Feb. 1803.

My Lord,

AT your Lordship's desire, I here send you an account of the drainage of the Lock of Cotts, going forward on your Lordship's estate in this county (Moray). It is scarcely possible for me to describe the difficulties that have been encountered, owing to the blowing sands at the sea, those admitting no outlet for the mill water, while the Canal was digging, and the adjoining river runs two feet higher than the bottom of the Canal.

The Lock of Cotts contained 217 Scotch acres of water and marshy grounds around its banks, scarcely yielding 25*l.* of yearly rent.

It was at all times apt to be followed by the communication of an adjoining river, with the stream issuing from the Lock. To avoid this, and gain more

fall, a Canal was begun to be dug from the sea in January 1801, and in October following it was brought to the Lock mouth, being a distance of 2200 yards, and through ground, a great part of which could only be raised by the pick-axe.

In consequence of that summer's work 80 Scotch acres of fine land were gained, and sown with Oat crops, 1802, which yielded a good return, and several acres more, which had carried a crop the preceding very dry year, were fallowed, dunged, and sown with Essex seed wheat on the 29th of September last, which now looks uncommonly well.

Last summer 1200 yards of Canal were dug through the body of the Lock, by which 20 acres more land will be got for crop 1803; and next summer 800 yards farther up the Lock will be dug, the work finished, and in all probability the whole drained off, by which 137 acres

acres of good land, fit to carry abundant crops of wheat, oats, and clover, will in all be gained, besides eighty acres of inferior sandy soil, probably adapted for willows, or other aquatics, which by shedding their leaves annually would ultimately enrich, and in the mean time beautify such grounds.

The Canal is in our place 60 feet wide at top, varying according to the fall of the ground to 40, and down to 18 feet, being uniformly 10 feet broad at bottom. To prevent the sea from getting admittance into it, a valve is hung on a stone bridge, at the mouth of the Canal, which shuts itself at high water, and is opened by the stream when the sea recedes. Two more stone bridges were also built in the summer of 1801, on roads which cross the Canal, and 3000 yards of strong flow dyke are raised on its banks to prevent the depredations of the river Lossie on the Lock lands.

The present expenditure is 950*l.* 6*s.* 7*d.* and 200*l.* more may be requisite to complete the whole.

I have the honour to be,
with much respect,
My Lord,
Your Lordship's most obedient servant,
WM. YOUNG.

The Right Hon. the
Earl of FIFE, &c.

	£.	s.	d.
The 100 acres already drained would let for 30s. per acre, yearly rent, or - - - -	150	0	0
And if, as is supposed, 37 acres more are brought into culture next summer, they will also yield 30s. per acre, or - - -	55	10	0
Total - - -	205	10	0

Besides the 80 acres of uncertain value.

I keep up the five houses successively mentioned in this letter, to all of which I have made large additional buildings. Thus numerous labourers and artificers are employed. They all lie

lie at the distance of from 12 to 25 miles from Duff-House, except Mar-Lodge, which is about 100 miles distant. The roads being all good, I frequently go to those different places, to inspect the works carrying on, see how my plantations are kept, and give directions for extending them. I have planted altogether between eleven and twelve thousand acres. The thinnings of the plantations are regularly carried on as stated in my former letters to the Society. They are now of much more value. Last year they were sold for 1000*l.* and every succeeding year they will be of more value: no trees, however, are cut, but for the benefit of those they stand too near. A silver fir, a larch, and a Platonist, were planted in the Duff-House Park near the river in the year 1758. The larch which stood in the middle was overcome by its too powerful neighbours, and was in a declining state. I then desired it might

be cut down, but not sold. My carpenter cut it into deals that measured ten feet in length, and one foot ten inches breadth, and made out of it a dining-table large enough for fourteen people, and two very good breakfast-tables It is little inferior in appearance to mahogany.

The silver fir measures 18 inches from the root, is seven feet ten inches in circumference; and its height is sixty-five feet. The Platonist at the same distance from the root measures seven feet three inches in circumference, and six feet above six feet five inches. Its height is fifty-five feet.

It would be well if any method could be devised to prevent men who have no taste for such improvements, or sense of their utility to the country, from cutting down woods prematurely; such as was the case on the death of the late Duke of Queensberry, when plantations of not more than twenty years standing were

were cut down like fields of unripe corn.

The Duke of Richmond, I understand, has numbered many trees of a certain size, and very properly entailed them under proper regulations to prevent use.

If this, or some such method, was generally adopted, in a few years many thousands might be kept in this country, which are annually expended on foreign wood.

Fife-house, Whitehall, is a Crown lease. I have made two different embankments, which with the buildings have cost me many thousand pounds. The first embankment was made about five years after my entry on the lease, and the other twelve years after; they were made at a great expense. All the trees and shrubs planted in these embankments, as also the stones, were brought from my estates in Scotland. The workmen too were my tenants, and they have exe-

cuted the whole in so masterly a style, as does them the highest credit. Some of the Elms planted in the first embankment measure five feet four inches in girth, and above fifty feet in height. At the time I carried on these very expensive works, I considered myself as holding a very certain tenure from my Royal Landlord, the Crown.

I combated at great expense and trouble the right of my Royal Landlord with the city of London. Confident I might renew my lease when I was inclined, on paying the usual fine, and assured of this likewise by the treasury, I delayed till my lease was half run before I demanded a renewal. After all this expenditure, and the greatest trouble at the different offices, I have been put off from time to time, and find that the tenants of the Crown are in a more dependent situation than those of any subject or corporation.

I flat-

I flatter myself I shall be excused for the length of this letter, as it proceeds solely from a desire to communicate every information in my power to a Society who have done so much for the encouragement of Arts, Commerce, and improvements in Agriculture.

I am, Sir,

Your obedient humble servant,

FIFE.

Fife-House,
February, 4, 1803.

Mr. CHARLES TAYLOR.

The

The GOLD MEDAL of the Society was this Session adjudged to the Right Hon. Lord Viscount NEWARK, for encouraging the GROWTH of OAK TIMBER, by sowing ACORNS and planting OAKS in Nottinghamshire; from whom the following PAPERS and CERTIFICATES were received.

SIR,

I BEG the favour of you to lay the inclosed Certificate before the Society for the Encouragement of Arts, &c. and respectfully to express to them my hope, that it may entitle me to the honour of their GOLD MEDAL. Should any farther document be necessary, and if you will have the goodness to inform me, I will immediately transmit it to you.

I remain, SIR,
Your most obedient servant,

Thoresby Park, near Ollerton, Nottinghamshire, Oct. 30, 1802. NEWARK.

CHARLES TAYLOR, ESQ.

Extract

Extract from a Sketch of the Ancient and Present State of Sherwood Forest, in the County of Nottingham, by Hayman Rooke, Esq. F. S. A.

THE second Duke of Kingston planted two large clumps of Evergreens, the one circular, the other square, at the west end of Birkland, called Hanger Hill. Lord Viscount Newark has added twenty-five acres, partly forest-trees, and partly firs, and called it *Howe Grove*, in honour of Earl Howe and his victory. He has also added fifteen acres of plantation at the eastern extremity of the Assarts, adjoining to Thoresby Park, and called it after the Earl of St. Vincent, for the same reason; and twelve acres on the northern border or boundary of Budby Forest, called *Duncan Wood*, after Lord Viscount Duncan. These, with

with two strips on the Forest side of the Park, of a few acres each, called *Portland-Grove*, and *Bentinck Border*, make the whole of the Thoresby Plantation on that side.

To the SOCIETY *for the* ENCOURAGEMENT *of* ARTS, *&c.*

WE, whose names are subscribed, do hereby certify, that an inclosure of twenty acres was sown last winter with acorns, by the Right Hon. Charles Lord Viscount Newark, in the Parish of Edwinstowe, in the County of Nottingham, that the plants are now in a thriving condition, and that the said plantation is properly fenced and secured from depredation.---Dated the 9th of October, 1802.

THOMAS TURNER,
Curate of Edwinstowe.

JOHN BRISTOWE, B. D.
Rector of Weston, Nottinghamshire.

SIR,

SIR,

IN answer to your letter of the 21st instant, I beg leave to inform you, that the Oak Plants now growing in Lord Viscount Newark's plantations in Thoresby Park (from acorns sown), will average 60,000 per acre. They are very promising plants, thriving, and in good health and condition, and will be properly regulated and thinned as occasion may require.

I am, SIR,

Your most obedient servant,

W. PICKIN.

Whitemoor,
Dec. 28, 1802.

A LETTER also from THOMAS TURNER, of Edwinstowe, Nottingham, certifies that the probable average number of young trees now alive on each acre

acre is about 60,000, that the inclosure is well fenced and perfectly secured from depredation, and that the trees look very well.

SIR,

YESTERDAY evening's post brought me your favour of the 1st instant. Perhaps, from the fear of being prolix, I have erred the other way. The land here (I speak of the forest land on which I live) although it has borne and will bear noble forest trees, seems ill adapted to corn. My late Uncle, the last Duke of Kingston, was so well persuaded of this, that he threw between three and four hundred acres out of tillage, the greater part of which, during the last fourteen years, I have been able to plant, and I must say with great success. We clear away the ling with a very strong trench

trench plough, and then leave room between the rows of acorns, or young trees, for horse hoeing. Nothing can answer better, and I may without vanity say that we have succeeded as well in this particular, perhaps better, than most of our neighours, although there is a very laudable emulation on this point, between Lord Titchfield, Mr. Foljambe, and others who have large tracts of forest land. I know not whether the appeal is regular; but Mr. Skip Dyot Bucknall, one of your Vice-Presidents, knows the fact to be as I have asserted.

I am ever, SIR,

Very much your obedient servant,

NEWARK.

The

The GOLD MEDAL or THIRTY GUINEAS, at the option of the Candidate, was this session adjudged to JOHN SHIRREFF, Esq. of Captain-Head, near Haddington, in North Britain, for his PLANTATION of OSIERS; from whom the following ACCOUNTS and CERTIFICATES were received, and who, in a very handsome manner, as noticed in one of the letters annexed, preferred the Honorary Reward of the Society.

SIR,

I HAVE taken the liberty to address the following Essay to the SOCIETY for the Encouragement of Arts. It contains every useful information, as far as I at present recollect, which I have, during several years attention to the subject it treats of, been enabled to acquire. Perhaps I have been too particular and prolix,

prolix; but let me hope that an anxiety to be clearly understood, joined to an ardent wish, that any person intending to plant Osiers, may be able, from the perusal of this Essay, to adopt reasonable means for promoting their successful cultivation and vigorous growth, may plead my excuse.

I have the honour to be,

SIR,

Your most obedient servant,

JOHN SHIRREFF.

Captain-Head, near Haddington, North Britain, 19th Nov. 1802.

CHARLES TAYLOR, Esq.

TO a mind deeply impressed with the high national importance of encouraging the domestic cultivation of every species of useful production of the soil of this island, it affords most sensible

delight to notice the encouragement and flattering rewards extended to agricultural pursuits by the Society for the Encouragement of Arts.

It was not, however, with a view to obtain any premium, that the salictum described in the sequel was established, but as the most profitable mode of employing the ground it occupies. Indeed it was only in the course of last summer, that the writer of this little Essay came to know that the Society had offered any premium for the cultivation of Osiers. When he comes forward in competition, he must rest his humble pretensions to reward on the simplicity, and perhaps correctness of his mode of culture, with the value of produce in consequence thereof, and not on the extent of ground planted with osier.

The ground planted in winter 1801-1802 contains, as by certificate under cover with the letter which accompanies

panies this, seven acres two roods and one pole. It is situated in a bottom sheltered from the west and north winds, by hedges and hedge-row trees, but exposed to the south and east, the fences being low on these sides. The soil may generally be denominated a clayey loam of a coarse quality. It had probably, till about thirty-five years ago, been under natural meadow, and a considerable part of it was subject to be flooded in winter. An open drain or ditch, six feet wide and three and a half deep, cured it of this inconvenience. It had afterwards been in the rotation of crops common to the practice of good agriculture in the district, and frequently laid down to pasture in excellent preparation for several years, at different times, since that period. The pasturage, however, was but coarse, and crops of grain, excepting oats, were seldom valuable.

In spring 1801, it was carefully under-drained, having been ploughed the preceding autumn, to mellow the soil in preparation for turnip and *roota baga*, for which the piece was afterwards fitted by repeated ploughings, &c. and manured with about sixteen double horse cart-loads of good stable-yard manure to the statute acre*. The turnip and *roota baga* being drawn in October and November, about the 1st of December, 1801, the planting commenced, the land having previously been ploughed up, with a deep furrow, into ridges, or beds, eighteen feet wide. The rods used for plants grew immediately contiguous, on a part of the same field, on which a plantation had five years before been established. These rods were of great length and considerable thickness, and would have made good hoops. They were cut from the

* The writer of this means to do himself the honour of addressing a communication to the Society on this subject.

the stocks, chopped into pieces of a foot long, on a *smooth* block of wood, by a light and very sharp hatchet, and all of them were put into the ground at two shillings a thousand cuts. The hands of the planters were guarded by a piece of neat's leather, to save the palm, with a hole in it for the thumb, to keep it in its place, and fixed on the hand by a strap of the same sort passing round it. A common garden-line, about sixty feet long, divided with slips of leather at the distance of eighteen inches from each other, was used in planting. Two planters began at the middle of the line, and proceeded, sticking in the cuts, towards the extremities, where they generally arrived at the same instant, and shifted the line to new ground, a measure of eighteen inches standing at each end to determine the distance between the rows, so that the plants stand eighteen inches apart, in every direction.

The cuts were struck off aslant, and pushed into the ground with the slanting face made by the hatchet turned downwards, lest rain should run into the pith, and rot the stock. The plants or cuts were put in sloping to an angle of about 75 degrees, and almost to the surface of the soil. An inconvenience, however, not expected at the time of planting, arose from pushing the cuts so far home; and the advantage of easily preserving a handsome stock or head for several immediate successive years, was in a great measure counterbalanced by the tender shoots springing at and under the surface, being exposed to the attack of grubs, in the manner that grain is in May, as was the case in some spots of the plantation under description. The lower the shoots come off the stock, the more readily do *slugs* find access to them. From all his experience, the writer conceives it safer to make the cuts from fifteen

fifteen to seventeen inches long, and allow four or five of these inches to remain above ground, to be cut over by the surface of the soil, when the heads of the stocks, in a series of years, shall have become too bushy. By this operation the vigour of the plants is renewed in the most decided and effectual manner. An instance of its efficacy came to the writer's knowledge about two years ago.

In the month of May last the whole ground planted during the preceding winter was hoed over, the surface being completely mowed to the depth of an inch and a half, for five pounds ten shillings by the piece. The ground being then remarkably dry, strong heavy hoes with long heads and narrow faces were used. It was hoed again in June, for two pounds ten shillings, with Dutch or shoving hoes. This operation made the surface as fine and clean as any garden ground. The showers in

July and hot weather in August bringing up a new flush of annuals, made it necessary to hand-weed the whole, about the last week in August and first of September. The hand-weeding was performed chiefly by women and children at 4*d.* to 7*d.* per day, and cost one pound thirteen shillings. In some places young plants of the ranunculus repens made their appearance, no doubt from latent seeds; this being a perennial plant, and growing close to the surface of the soil, the Dutch hoes were applied a second time, with which the plants of it were cut over below the bulbs: this cost about seven shillings more.

The writer had planted about five statute acres, at two different periods prior to 1801, with Osiers. These have, one year with another, *neated* fully eighteen pounds ten shillings an acre. About three quarters of an acre were reserved standing three years for cuts

to

to the seven acres two roods and one pole established last winter: the remaining four and a quarter acres neated one hundred guineas, last season, paid at Candlemas for one year's growth, deducting about two pounds seven shillings for hoeing and trimming the preceding spring. The whole Osier ground in the writer's possession, and which extends to twelve and a half acres statute measure, including the ground planted last winter, is to be cut this November and December, 1802, being all a single year's growth. The price is two hundred and twenty pounds, to be paid at Candlemas next, and, if not all cut before next Christmas, by special agreement, the price is two hundred and fifty pounds.

The sorts of Osiers in the writer's plantations are, the viminalis or common; a variety with darker-coloured bark and slenderer shoots, more esteemed. Another sort the writer had originally from Surry, the

the leaves of which are large, long, sharp-pointed, serrated, of bright green, and smooth on both sides: the bark is reddish where exposed to the sun and air. The shoots are thick at the lower extremity, tapering much towards the point. A fourth sort is a valuable osier with bark of a dusky ash colour, and as it were fluted in the longitudinal direction of the shoots, towards the smaller extremity; the leaves are serrated, pale green, and smooth on both sides. A fifth kind much resembling that last described, the leaves of which are also pale green, smooth on both sides and serrated, but narrower, smaller, and sharper-pointed. Its back is not so dusky; it grows taller, and produces more shoots than that last described; and though they are good twigs, yet they are rather inferior to those produced by the former of the two. These are the principal varieties composing the plantation submitted in competition.

petition. There are also a small patch of the golden willow, and another of what is called the packthread, in this district, and there are about thirty square yards of each sort.

The whole of these Osier grounds are so situated, that water may be thrown over them at pleasure, for a sum of money under five pounds: not that there is as much water as would serve to refresh the whole at once in dry weather, in summer; but only each bed in rotation; a continual supply being afforded by strong springs carried off by covered drains from fields more elevated. This improvement is meant to be put in practice next summer; for, although wet ground is by no means necessary to produce good osiers, water *at command* is, by the writer of this Essay, considered of no small importance to the whole vegetable world. It is from the luxuriant growth of part of his principal plantation to which water

is

is given at will, that the writer concludes in favour of watering in dry hot weather. The part alluded to is a bank of good earth thrown out of a deep ditch or open drain, that skirts the whole of the north and west side of the ground. This bank is about four hundred yards long, and on an average may be three and a half broad. It had for many years been covered with thistles, docks, hemlocks, &c. and though these had been frequently mowed over and more than once were grubbed up with the spade, and hoes made for that and similar purposes, they soon again became a nuisance. In the winter of 1798 it was trenched to the depth of two spades and a shoveling, and planted with with osiers. The water has been sent in another direction in severe weather, and in very dry hot weather is again turned into the drain immediately behind the bank, and part of it into a small cut on the south side in front. On this bank,

formerly

formerly a nest of weeds, the writer has reason to think more value has grown every year since it was planted with osiers, than on any piece of land of the same extent, within some miles of it.

The grand errors into which most persons fall who attempt to establish plantations of osier, seem to be the following :---employing improper soil, peat earth, perhaps, or poor bog, imperfect, or perhaps no preparation of the soil, though proper in other respects; bad, or useless sorts planted; too few cuts put into the ground; want of culture, particularly during the first spring and summer after planting; allowing the shoots to be cut over after Christmas, and before the middle of March; which may be the cause of the stocks being much weakened by hard frost succeeding heavy rains immediately after the twigs have been cut, and before the wounds from the knife are healed up. If it is expected

to

to rear the finest and most valuable twigs, the land must be cured of chilling weeping springs; and if the soil is not of considerable richness, it must be made so with manure. Moderate moisture is favourable to the production of fine twigs, but water *continually* stagnant may be considered as ruinous. The writer has seen good osiers grow where water stood in the bottom of an old ditch during the greater part of the winter months, but thinks that water continually stagnant is very destructive in summer by preventing the wood from ripening; and he apprehends that where good osiers grow in water, the roots must reach sound dry soil, immediately contiguous, which was the case in the instance mentioned above; for the soil is dry, and moderately rich also, on each side of the ditch. It may also be considered necessary to trim and dress the stocks from decayed wood, and to leave only

as

as many buds on each, as you think the plant will bring to good perfection in length and strength of shoot, cutting down the superabundant stumps to the old wood, extirpating the weakest shoots or stumps; and seldom leaving more than two buds or eyes on those you make choice of to stand to produce next summer's growth.

This operation should be performed in November, or in the beginning of December; or in the end of March, or beginning of April; going regularly over the plantation, with a strong, sharp pruning-knife, examining every stock with attention, and trimming it to the best advantage. All this can be done for a trifling expense, if the stocks are trained from the beginning, and regularly and carefully trimmed every time the plantation is cut over. Instead of an infinite number of small weak shoots, the longest probably, little above four feet

feet long, as may be observed in plantations where no attention is paid to training and trimming the stocks, or pains taken to keep down weeds and grass, by careful and regular hoeing; the writer, by pursuing a different and opposite management, has the satisfaction to say the shoots on his plantations of Osiers, established prior to 1801, are from four to nine feet long, and of the best quality. Where any plants have failed, their place should be early supplied; that is, next season, as soon as the plantation is cut over. Pieces two feet and a half long may be used for cuts, allowing eighteen inches to remain above ground, to secure air and head room during the following summer. Indeed, a greater length of the rod put in would afford these advantages still more decidedly: but it is conceived the superior power that would thereby be given to the winds to agitate the roots, would counterbalance

balance the benefit of the additional air and head-room, which by this means might be obtained.

The writer is of opinion, that either the method he adopted, of taking a crop of turnips, and drawing and storing it, or what he practised on the part of the same ground planted in the winter of 1796-1797, viz. summer-fallowing the ground, and manuring it the preceding summer, or else trenching the ground where the depth of soil will allow, will prepare ground to carry osiers with a reasonable prospect of success.

He also conceives the value of the produce of his plantations, and thriving state thereof confirmed by the certificates and most respectable reference, to satisfy the Society of the price he has sold it for, which accompany this Essay, tend strongly to prove from *facts*, that his modes of cultivating osiers are not the worst that ever were adopted. If they meet

with the approbation of the Society of Arts, it will afford no small gratification to

SALICTICUS.

The Certificates alluded to in the above Essay, are from ROBERT LORIMER, D. D. Minister of Captain-head; DAVID SHIRRING, farmer, and ANDREW PRINGLE, both of the same place; WILLIAM DICKENSON, land-surveyor; ROBERT WILSON and GEORGE BROWN, of Balincrief; and JOHN CROUCH, basket-maker, of Edinburgh.

On the Secretary writing to Mr. SHIRREFF in the usual mode, to know whether he would accept the honorary or pecuniary reward of the Society, he returned the following answer:

SIR,

SIR,

I LOSE no time in acknowledging the receipt of your highly esteemed favour of the 19th instant, which came to my hand only with this morning's mail. Seldom has any circumstance in my life afforded me more genuine gratification than this honour conferred on me by the Society of Arts. Heaven knows I am not rich: yet I should think but meanly of the man who could put a much greater sum of money than thirty guineas in competition with any of the honorary rewards of the venerable and patriotic Society for the Encouragement of Arts, Manufactures, and Commerce. I give a decided preference to the Honorary Medal of the Society, and hard must my fate be on that day on which I part with it. We begin to drill turnip in this district of the Island, about the last day

of May and first of June. If I can possibly arrange matters to enable me to be so long absent from my business, it will give me high satisfaction to attend personally at the Society's house on the 31st of May next, and receive the Medal from the honoured hand of his Grace of Norfolk, whose principles and conduct adorn nobility itself.

I have the honour to be,

SIR,

Your most obedient servant,

JOHN SHIRREFF.

Captain-head, near Haddington,
April 25th, 1803.

CHARLES TAYLOR, ESQ.

The

The GOLD MEDAL was this Session adjudged to the Rev. T. C. MUNNINGS, of East Dereham, in Norfolk, for his Experiments on the Culture and Preservation of TURNIPS; from whom the following Communication and Certificates were received, with a Machine, being an Improvement of his former Drill.

IN the XVIIIth Volume of the Transactions of the Society, published in 1801, is contained an Account from the Rev. Mr. Munnings, of Experiments made by him to determine the comparative Advantage of the Drill or broadcast Method, in the Cultivation of Turnips; for which he received a Premium of the Silver Medal and ten guineas from the Society. Mr. Munnings, by an interesting course of experiments since pursued by him, and published

under the title of "An Account of some Experiments for drilling and protecting Turnips, in the years 1800, 1801, and 1802;" has fully shown the superior advantages of the drill-husbandry for Turnips, as will appear by a reference to that Tract, and the numerous Certificates it contains, which will render unnecessary a recapitulation here of that Account. The following statement is a continuation of the subject since that period, and alludes more particularly to the desirable object of providing a valuable winter food for sheep and cattle, by the preservation of turnips through the months of February, March, and April.

DEAR SIR,

I SHALL send to your address a hamper containing some specimens of my preserved turnips. I believe you will receive them on Tuesday next, (March

(March 2d) as I shall forward them by the mail from Norwich on Monday afternoon. I hope you will do me the kindness to exhibit them to the Society for Encouragement of Arts, &c. on Wednesday evening, and that they will be as much approved by them, as they already have been by all who have done me the favour of looking over my crop. I think I may with *truth* say, that at this time I have more *real sound* turnips, which the frost never touched, than all the great farmers in the county of Norfolk.

I had yesterday the honour of a call from Nath. Kent, Esq. (a gentleman well known, I am sure, to the Society of Arts), who expressed his approbation of my plans for preserving turnips as follows: "I look upon what you have done to be one of the greatest improvements hit upon in the memory of man; and of the first consequence to the

agricultural world. The turnips are a few of many hundreds, taken yesterday from my land, and which were exhibited to those gentlemen of the West Norfolk Agricultural Society whose names will be found in one of my Certificates.

I have sent some of each sort, red and white, in order to prove that my plans are equally efficacious for the protection of all kinds of turnips. I cannot forbear adding one singular fact in the form of a Certificate. I this morning called upon a gentleman for whom I had drilled a few turnips on good land. Taking one of them which was very sound, and one apparently as sound from the broad-cast part of his field, we compared by similar and equal pieces the specific gravities; and it turned out to be one-tenth in favour of the drilled turnip. He (my friend) judged that my protected turnips, from the inferiority of my land, could

could not exceed his, drilled, in specific gravity. I took a cube of his turnip of about $2\frac{1}{4}$ inches, and very carefully and curiously taking a similar cube of the first protected turnip I came to, I have found more than one-eighth in favour of my *protected* turnip. Hence my protected turnip would exceed his unprotected broad-cast on better land, by more than one-fifth of the whole weight.

THOS. C. MUNNINGS.

February 27, 1802.

DEAR SIR,

I HAVE sent you a fair sample of my *preserved* turnips. A part of them were taken from my land on Friday morning last, for the examination of a Committee of the West Norfolk Agricultural Society; and a part were pulled up for Mr. Kent's inspection in the after-

afternoon of the same day. I should have sent more tops with them, but for the inconvenience of packing them. I solicit the attention of the Society of Arts to the very perfect preservation of them, as the very leaves have their stalks *now*, which I defended in November last, and they remain sound and full of juices. I flatter myself that the Society will be as pleased with as I am proud of them, and that they will consider me as having completely fulfilled their wishes in the two premiums to which my experiments point, though "I have not fully complied with the conditions of the same." It will afford me much satisfaction, indeed, to be regarded by them as giving birth to a practice which may eventually be of very extensive and solid public advantage; and which, by adding to the quantum of human food, may have a direct tendency to reduce the price of the neces-

necessaries of life; to assist in the maintenance of an increased population; to promote the prosperity of my country; and to meliorate the condition of man.

I am, DEAR SIR,

With warm benevolence,

Your obliged and obedient servant,

THOMAS CROWE MUNNINGS.

March 1, 1802.

DEAR SIR,

AFTER the very ample account which I lately had the honour of transmitting to you relative to my drilled and preserved turnips, I should scarcely dare to address you again concerning them, did I not conceive that it is now in my power to speak with the most positive and decided certainty respecting the very great importance of their value during the months of March and April.

It

It is certainly in those months that nutritive vegetable food is of the most consequence to the farming world. It is certainly by a supply of such food for the consumption of stock in those months, that farmers may be most advantageously enabled "to shorten the wintry void" which so frequently operates to the deterioration of their cattle, and to the diminution of the quantity of meat designed for the public market. It appears to me, that the Society of Arts have been duly sensible of the truth of the foregoing remarks, and alive to the benefits which would result to the community, if turnips were preserved in such a manner as to afford the very desirable supply of food above alluded to. The Society therefore has principally confined the object of its premium for preserving turnips to those two important spring months. I hope it may not now be too late

late for me to offer to the Society some additional evidence of my having accomplished the great end of their wishes, by feeding my sheep and cows during the month of March, and great part of April, on turnips, and generally as sound and good as those which I sent to them in the end of February last.

I understand that the Society, in consequence of my communication extending only to the end of February, have considered me as entitled to their *thanks;* but as my account did not include March and April, I could not be regarded as coming within the meaning of their premium. With respect to their premium in its full extent, I would say, I do not consider myself worthy of such an honour, and I shall, as far as I only am concerned, always consider the thanks of such a Society as gratifying the honest ambition of my heart, and stamping a material value

on

on those exertions for which they are bestowed; but in this instance, I am looking beyond myself, and considering the influence which the judgment of the Society of Arts may have upon the minds of others; and I am for that reason desirous of begging peculiar attention to what I would here advance. At the time of my sending my account (February 26, 1802), I could only have spoken of the months of March and April *prospectively*, or with conjecture; and I might have been considered as obtruding upon the Society what might or might *not* happen. The case is now altered, and I can call to my assistance "the gone-by experience" of those months, and I can say to the Society of Arts, "in aiming at the attainment of the object of your premium for preserving turnips, though I have not positively confined myself to the road chalked out for me, I have arrived by a route indeed some-

somewhat circuitous, but I have arrived at the place of destination, and I am therefore inclined to hope that if my deviation from the appointed track cannot be entirely overlooked, it may at least be regarded with the liberal indulgence of candour, and that I may be allowed to participate of that bountiful remuneration, which if my course had been direct, I might perhaps have received *in toto*." I will only detain you longer to say, that it would afford me a most pleasing satisfaction to give to the Society any further information in my power on a subject of which few indeed can appreciate the national importance; and to remark that at the present moment, when a laudable spirit of agricultural improvement actuates the minds of many, the members of the Society of Arts may very materially stimulate to emulative enterprise a number of individuals,

viduals, whose lives would otherwise be spent in listless and torpid inactivity.

I am, DEAR SIR,
With great regard,
Your obedient servant,
THOMAS CROWE MUNNINGS.

REV. SIR,

ON Thursday last passing by a field of your turnips, curiosity led me to walk into them, and to my great surprise I found them remarkably good; and as I am and have been often called upon to value turnips, &c. I have not seen any this season, where I have been valuing, to equal yours, although some of the lands which I have been on are far superior to yours. Passing, however your way again this day, I see that you have drawn them, and replaced them in rows of about 15 feet asunder, where they are entirely secure from

from the sharpest frost. I also find that your turnips were drills, eight in about fifteen feet, and now only one in that distance. Hence your land now receives a winter's fallow, which must be of great utility to the summer crop. I flatter myself, therefore, that they are done at the least expense, and guarded against the sharp weather in the best manner I have ever seen. I must own you have done great credit to your country, as all sensible men will follow your rules, in preserving their turnips in the same way.

I am, SIR,

Your obedient servant,

JAMES CHRISTMAS.

Scarning, Nov. 20, 1802.

REV. Mr. MUNNINGS.

WE whose names are underwritten, servants and labourers of the Rev. T. C. Munnings, do hereby certify and declare, that turnips drilled, *protected* by him through the whole of the last severe winter, were perfectly sound, in the months of February and March, and part of April last, and were in those months used to feed cows and *sheep*, that such protected turnips were in all instances of comparison of superior weight to any broad-cast unprotected turnips, to be found any where in this neighbourhood.

JOHN TUCK.
JOHN ROYAL.
JOHN GANT.

N. B. Every one of these men has worked for me more than seven years.

T. C. MUNNINGS.

SIR,

SIR,

IN answer to your letter, I can only say, that in my judgment the turnips of the Rev. T. C. Munnings are much better than those of his neighbours on the same sort of land; that he has most effectually protected them from the severity of the frosts; that I have seen some, and heard of others who have imitated his plans for such a purpose, and that I have no doubt whatever of their tendency being highly advantageous to the country at large.

I am, SIR,

Your very obedient servant,

JAMES CHRISTMAS.

Scarning, Dec. 18, 1802.

Mr. CHARLES TAYLOR, Sec.

DEAR SIR,

THE following is an account of my various plans for preserving turnips during the winter months, which I have drawn up for the Society of Arts, &c. and which, through the medium of your friendly assistance, I wish to have the the honour of presenting to its members. I hope it will be considered by the Society as meriting their kind acceptance; that they will regard it as the grateful attempt of an humble individual to manifest a due sense of the honourable and distinguished marks of approbation which he has received from the Society; and if it be not too much to expect, that it may acquire *notoriety* by a public appearance in the next Volume of their Transactions.

I have the honour to be, SIR,

Your obliged and obedient servant,

THOMAS CROWE MUNNINGS.

April 21, 1803.

CHARLES TAYLOR, Esq.

Preser-

Preservation of TURNIPS *during the Winter Months.*

DR. Martyn, in his corrected and newly arranged publication of Miller's Dictionary, when speaking of the "propagation and culture of turnips," under the head of "accidents and their cure," enumerates a variety of enemies with which this most valuable vegetable has to combat in the early stages of its growth, and points out the practices to which agriculturists have from time to time resorted for the purposes of prevention and defence. But before Dr. Martyn concludes his observations, he says: "The last enemy that I shall mention is severe frost, which usually destroys the early-sown turnips, and much injures the late ends. They are also difficult to get at in this situation, and do the stock but little good. The only method of counter-

acting this evil is to preserve or store up a certain quantity of turnips in case of frost or deep snow."

It has long been considered by those who are engaged in farming as a material desideratum, to defend and secure turnips from that host of foes with which they have to contend, and more particularly to preserve them from the injurious effects of frost, in order to receive the full benefit of them as winter and spring food for sheep and oxen.

Dr. Martyn indeed mentions some methods which have been pursued for the attainment of such an end; but as none of them have been admitted into very extensive practice, it may be presumed that they have been abandoned, on account of the difficulty of executing the prescribed work, on account of the expense attending it, or on account of its being inefficacious. Turnips have however been considered of so much importance,

tance, that the attention of many Societies has been directed to the general improvement of their cultivation, to *the preservation of them during the winter months*, and every encouragement which marks of honourable distinction can afford has been held out to incite agricultural experimentalists to devise and to essay means for the effectual protection of turnips, during the winter months, upon the land on which they are produced.

Among Societies which have been liberal in rewarding the efforts of ingenious men, the Society for the Encouragement of Arts, &c. has held a situation most pre-eminently conspicuous; and amongst the variety of subjects which have engaged its attention, Agriculture has been regarded with particular favour; the very great importance of turnips, has been most peculiarly adverted to; and as it has *twice* been my lot to

be most flatteringly noticed by the Society, for my successful efforts in the cultivation, and for the protection and preservation of turnips during the winter months; it is my earnest wish to give as succinct, but at the same time as clear an account as I can of my experiments for such purposes.

In doing this, it must of necessity happen that my observations relating to matters of fact will be nearly a transcript of former communications; I will endeavour to be brief, but I would wish to be perspicuous. It must be understood, in the first place, that my turnips are *drilled* at the distance of alternate furrows, that my ridges are set out precisely the width of fifteen feet, and that each ridge contains exactly eight rows of turnips. This being the case, I have at various times within the last four years made use of the following methods of *preserving turnips during the winter months.*

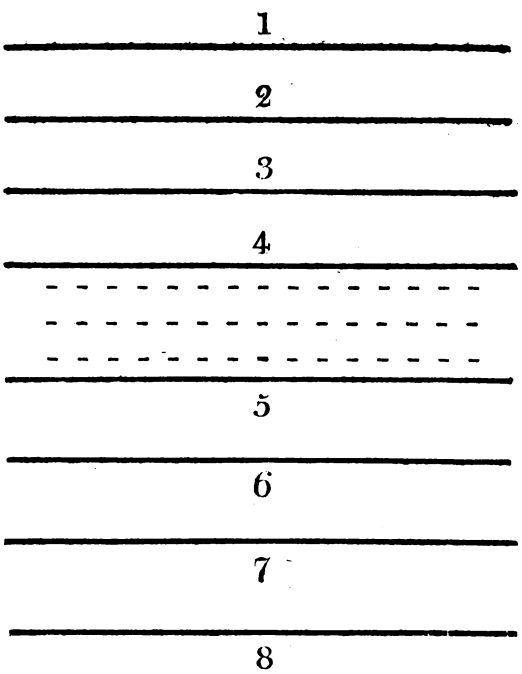
The

The first and most simple which I shall mention, was only with a narrow-set double-breasted plough, drawn by one horse to plough between the rows, and throw mud each way upon the apples of the growing turnips.—The advantages of this mode were, a partial ploughing of the land in the early part of the winter, and a preservation (almost perfect) of the turnips for spring consumption.

The second mode which I next invented (I say next invented, because the first mode differs from the Northumberland practice only in the circumstances of my turnips growing upon a flat surface, instead of the tops of two furrow work, and are therefore more easily defended with a plough) was first executed by casting away the alternate rows for autumnal consumption; thus leaving rows somewhat more than a yard asunder, and then with a one-horse single-breasted plough

plough moulding up the same; thus giving to the land the appearance of what is called Tops and Balks; each top embracing and defending a row of turnips, and the balks being in the lines from whence the turnips were removed. I look upon the advantages of this plan derived from such seasonable ploughing to be similar to those in the first-mentioned mode; but as the turnips are covered with a greater body of earth, the preservation of them is so much the more perfect because the frost must be more intense before it affects them, and, in case of a thaw, is discharged from them more gradually. The third mode may easily be conceived, by the following supposition. Let the lines 1, 2, 3, &c. represent the eight rows of turnips growing upon a ridge, eight being the most convenient number of rows for the easy execution of the work.

1—



Conceive half of these lines to be upon one ridge, and half upon another; in that case, there will be a furrow between 4 and 5. This furrow is to be opened with a double-breasted plough (drawn by one horse), which will raise mould for the

the protection of what I will call the insides of the two rows 4 and 5; the rows 1, 2, 3 were then to be pulled by one man or woman, and put into the opened furrow between 4 and 5, with their tops inclined towards 4. In the same manner the rows 6, 7, 8 are to be pulled by another man or woman, and put into the same furrow with their tops inclined towards 5. Two or three furrows are then to be ploughed, with a one-horse foot plough, to the outsides of the rows 4 and 5, and some mould from the third furrow so ploughed shovelled into the apples, and part of the tops of the collected rows; (of this shovelling I think from what I had done, that a good labourer will finish two acres in three days) and the ploughing may be then carried on so as to give the land almost a complete earth.

Of this plan the advantages are so evident as scarcely to need explanation.

Those

Those derived from the ploughing are here nearly complete, as three parts out of four of the growing crops are removed from their native beds in the very beginning of winter (say some time in November); and, deposited in trenches, continue for a considerable time in a state of suspended vegetation. The surface which is then turned up will be ameliorated by the frosts between that time and the early part of the spring; when, if the weather permit, the land may be ploughed *back again from the trenches*, and reap the advantages of a second earth in preparation for the following crop of corn. The turnips may, after this second ploughing, be most easily scattered about the field, which may be enriched by the feeding manure; or they may be carted off with so little injury to the land as to leave it in a very proper state for immediate sowing. But the peculiar advantage of this

this plan, and a most material one it is, consists in the wonderful facility with which turnips so defended may be got at, when those unprotected, or protected but in single rows, are fast bound by the frost.—Here as the whole of eight rows are collected into a small space, if the frost be extremely severe, the land will be kept open by the tops of four rows of turnips *united* in the lines 4 and 5, and being easily removed from the top of them, the whole body so collected will be exposed in a *sound* and *unfrozen* state. I conceive that it would be an *improvement* of this plan to use a little straw or haum for the purpose of covering the turnips before the mould is shovelled over them, as it would increase the facility of uncovering them, not only during the severity of the winter, but upon the dissolution of frost would keep them cleaner, and render them easier of access.

Perfectly

Perfectly efficacious as this mode was experimentally proved to be, it failed of giving general satisfaction to the *farmers*, who, objecting to the shovelling part of it, wished to have the whole of what was done confined to the powers of the plough. The last method therefore which I have made use of, was practically executed thus.—The eight rows of turnips growing as described in the last-mentioned mode, the whole of them were pulled, and put as *upright* and *close as possible* into the trench opened between two ridges, and then lengthening the spindle of a wheel plough, or the pulling-tree of a foot plough, so as to enable the off-horse to walk clear and wide of the turnips, they were buried almost entirely by means of the plough, and the whole of the land was clean-ploughed, at the time of protecting them. In the beginning of the month of March 1803, it was satisfactorily evident that

that the turnips were completely preserved, and that the land had received the entire benefit of a winter's earth.

As to the advantages derived from ploughing, I regard this plan as very little, if at all superior to the last-mentioned, and however the novelty of it, the facility of its execution, or the extreme neatness of its appearance when executed, may powerfully recommend it, I do not myself prefer it to the immediate foregoing mode, in which the casual advantages of shovelling *may* be very considerable, and I really think will always be sufficient to defray the expenses of that peculiar part of the operation.

It may not however be amiss to notice here that even in a broad-cast crop, this last-mentioned method may be practised if trenches be opened at the furrows, and turnips pulled from each side deposited in the same; whereas in all the other modes *drilling* is a *necessary* previous operation:

operation: and it may be added too, that if once ploughing up to the trenches be not sufficient effectually to mould up the turnips, the operation may be repeated till they are completely covered by means of the plough only. It may perhaps be grateful to the Society to be informed, that many farmers have tried this last mode with satisfaction and success; that all who have tried it, have now (March 1803) much sounder turnips than those who have neglected it; that for this mode the *Norfolk Agricultural Society* have adjudged to me their Premium for the *Invention* and *Execution* of a plan for preserving turnips upon the land where they are grown; that it was from turnips which I had thus preserved for Mr. John Repton, of Oxned-Hall, near Aylsham, Norfolk, that a parcel of them was sent by that respectable gentleman to the Board of Agriculture, in the latter end

of March 1803, after they had been examined by several experienced people, and particularly by Nathaniel Kent, Esq. (a member of the Society of Arts, and of the Board of Agriculture), who did me the singular honour, when he was questioned by his Majesty about Mr. Repton's turnips, of representing me to his Majesty, as the *fortunate discoverer* of so *important* an *agricultural improvement*, and of explicitly assuring his Majesty, " that this last season, when in Norfolk, there were, in many places, not ten *sound* turnips to be found upon an acre, there were not upon an acre of Mr. Repton's ten *rotten* turnips." So effectually had they been preserved by Mr. Munnings's plan of earthing them up.

Rejoicing therefore in the idea that I have rendered the work necessary for *preserving turnips during the winter months* so simple and so easy to be performed, that no objections to my plans can arise

on

on the score of difficulty, that expense (which is in fact less than the common expense of pulling the turnips) cannot with propriety be regarded as an obstacle to the execution of them; and that their *efficacy* (proved by unfailing success during the winters of 1800, 1801, and 1802) so honourably and so highly attested, cannot now be questioned, I hope it will not be thought presumptuous in me to observe, that in my solicitude to encourage the preservation of turnips during the winter months, I am only calling upon the farmers to give into a practice which has been verified by experiment, has been sanctioned by experience, and of which the private emolument and the public utility and benefit will be commensurate with the scale of its adoption.

The GOLD MEDAL, being the Premium offered for gaining Land from the Sea, was this Session adjudged to Mr. JOHN KNAPPING, of South Shoebury, in the County of Essex, from whom the following Papers and Certificates were received.

SIR,

IN the month of April 1801, I entered into an agreement with some men who had been accustomed to make embankments against the sea, to enclose 234 acres of saltings, or broken ground, which I had hired, upon lease, of the Rt. Hon. the Earl of Winchelsea, in the island of Foulness, and which was overflown by the sea every tide. I could have enclosed nearly 20 acres more at the same time; but did not deem it prudent, because in that case the base or foot

foot of my new bank must have been set too near the ocean; and by that means the surge, when the wind blew hard from the East, or North-East, would have been liable to damage and undermine it. The base or seat of my new wall is 32 feet; and I first contracted to have it only six feet high, and to be six feet wide on the top: to complete which, I agreed to give the men 58 shillings per rod. There are 304 rods of it, and the work so executed, came to 881*l.* 12*s.* But, judging afterwards that its base would still bear an additional height, which I conceived to be necessary for the better security of the land, I had the wall or bank made a foot higher, and allowed a contraction of one foot more for the slope or *batten*, as it is termed; so that its dimensions now are 304 rods in length, 32 feet base, seven feet perpendicular height, and five feet

wide at the top. This additional height cost me about 150*l.* more, which, added to the price of the first contract, and the planks for the workmen to wheel their barrows upon, &c. made the whole cost of the embankment amount to very nearly 1100*l.*

This wall or bank is entirely formed of earth, a considerable part of which I obtained by cutting a ditch, or *delft*, as it is usually termed, about nine feet wide, and about fifteen feet from the foot or base on the land side of the wall. This delft serves as a reservoir to take off the rain water from the newly-inclosed land, which is conveyed through the wall or bank into the sea, by a sluice or gutter, which is open when the tide is out; and through which gutter also the salt water can be let in, when necessary, to fill the delft or the ditches cut between the different fields, or enclosures,

to

to keep cattle apart, &c. By the end of the month of October 1801, this undertaking was completed, and the wall or bank remains firm and good, and will receive considerable strength and stability by sowing the seeds of the couch grass thereon, and feeding the same closely with sheep.

Before the land was thus enclosed, no use could be made of it, except that of grazing it occasionally with a few sheep when the tide was gone off. It now begins to grow quite solid, and will already bear the weight of a large bullock. It naturally begins to produce a sort of fine grass, which sheep in particular are very fond of, and which is of a wholesome quality, but not as yet very nutritious or fattening. That property, however, it will acquire more and more every year; and it will, I doubt not, in the course of less than twenty years, be as good grazing land as any on this level, and

may by that time be converted into tillage, if required.

I am, SIR,

Your obliged humble servant,

JOHN KNAPPING.

South Shoebury, Essex,
Oct. 15, 1802.

Mr. CHARLES TAYLOR.

SIR,

IN addition to the former statements sent to the Society respecting the land gained from the sea, by Mr. J. Knapping, in the island of Foulness, the following observations may probably be of some use for the perusal of those concerned in embankments of that nature.

In one of my first descriptions of the island in question, you will recollect that

that I said the greatest part thereof belongs to the Earl of Winchelsea: and among the number of farms in that place, that which Mr. J. K. now occupies (called East-Wick farm) is one of those which are the property of his Lordship. At the expiration of the last lease of the said farm, the old tenant refused it upon the terms offered to him; and among those who applied to rent it, was the present tenant, who voluntarily proposed to enclose, embank, and secure the saltings adjoining thereto, as they are termed, at his own cost and charge, provided that his Lordship would agree to grant him a lease upon certain terms and conditions then specified. With these proposals his Lordship was well pleased, and not only granted him a lease for twenty-one years, at a certain rent, but likewise made the like propositions to another tenant who held a farm adjoining;—and these propositions the other

other tenant also acceded to. Had the tenants not agreed to enclose the saltings, it is probable that his Lordship would have undertaken it at his own expense. But it must appear to be much more eligible, to every thinking man, for the tenant than for the landlord in such cases to do it; because the tenants are more likely to understand the nature and the mode, as well as the expense of embanking, than their landlords; and all that the landlord has to do, when such a thing is taken in hand by his tenant, is to see that it is done substantially. Under these circumstances Mr. J. K. undertook the matter in question; and he has completed it in a very superior manner.

His next object then was to discover and pursue some plan by which both himself and the community might be most benefited by this new inclosed land. It had been found by others in similar

similar cases, that to break up and convert such land into tillage too soon, would not answer: for the quantity of salts with which it is impregnated is so very great, that, when exposed to the sun, &c. they completely chrystallize the soil; and although the green corn during the winter and spring months, may have a luxuriant and healthy appearance when sown thereon, yet as soon as the earth begins to get dry, it is scorched and burnt up, so that scarcely any of it arrives at perfection. The plan, therefore, to which Mr. J. K. resorted was that of stocking it hard with sheep, and small Welch or Scotch cattle, which will eat a sort of weed provincially termed Lamb's Tongue (somewhat resembling the *sweet gale* in appearance, but not in smell), and which sheep in particular are fond of. By feeding it closely with sheep, (and of these the Welch, Norfolk, or South-down sorts are to be preferred) the land

becomes

becomes every year more solid, the briny particles subside, and a sort of very fine small grass naturally begins to grow, within the course of eight or ten years after it has been embanked; and in less than fifteen years it may be converted into tillage, and will produce wonderful crops, sometimes of mustard-seed, &c. But as these pernicious crops are what no tenant ought to be suffered to grow, so will it be the utmost wish of the present tenant to avoid growing them; for they usually so taint the soil, that they can never afterwards be eradicated or destroyed. The best way is to pursue the grazing system above alluded to, for at least the first fourteen years; and then, having previously laid out and divided the land into separate inclosures, it may be converted into tillage for corn, and that to advantage.—An excellent mode of managing such land, if it is meant to be tilled, is to lay about eight waggon-

waggon-loads of chalk upon every acre, when it has been embanked about fifteen years, and not to plough it till five or six years afterwards. It will then grow any sort of grain, and especially oats, beans, and wheat, in great abundance, and of most excellent qualities. Such is the process of management which the present tenant means to pursue; and there is scarcely a doubt, but it will answer his warmest expectations, should his noble landlord allow him sufficient encouragement to pursue it.

I beg leave to make another remark before I conclude this Essay; and it is this. If a quantity of the seeds of the cooch grass be sown; or, what is still preferable, if the roots of that grass be planted upon the bank, or mud wall, when it is first formed, that, with the treading of the sheep, &c. will tend much to strengthen its texture, and to preserve

preserve it from being injured by the tide.

I am, respectfully,

SIR,

Your obliged Servant,

J. WISE.

Rochford, 5th Jan. 1803.

Mr. CHARLES TAYLOR.

From another letter of Mr. Knapping, it appears that he began to undertake this embanking about the beginning of the month of April 1801, and that in the month of September following the whole was completed; that upwards of 230 acres of land were effectually inclosed and secured from the sea, at a very considerable expense, viz. one thousand pounds and upwards; and that this land is already converted into pasture,

pasture, capable of feeding a great number of sheep, and even bullocks, and is likely to become, in the course of a few years, fit for tillage, or any purpose to which land can be converted.

The above statement is confirmed by the Certificates,

T. Ellwood, Curate of Foulness.
Wm. Potton, Churchwarden.
T. Wiggins, Overseer of the Poor.
Edm. Witton, }
F. Bannester, } Inhabitants.
W. Meakens, }

The

The GOLD MEDAL of the Society was this Session voted to Mr. JOHN WRIGHT, of Pickworth, in the County of Rutland, for his comparative Experiments in Agriculture, from whom the following Communication and Certificates were received.

SIR,

IF you think the following experiments deserving the notice of the Society for the Encouragement of Arts, &c. I shall be much obliged to you to lay them before that respectable body. They are not sent in claim of any particular premium, but depend entirely on their own merit and the Society's liberality, which, according to one of their Prefaces, "extends far beyond the objects published in their list of Premiums." If they possess any merit, the author doubts not

not the Society will soon discover it;—if none, let them have their desert—the flames.

Experiment 1st.

June 15, 1802. Began to mow tares for soiling cattle.
July 27, Finished, being just six weeks.

Stock kept and Quantity consumed.

Nine cart-horses kept wholly upon them, without corn, or any other food. They had been used to a good allowance of corn previous to soiling, and were in high condition, though wrought every day; they worked the same on the tares every day (Sunday excepted), kept their flesh and spirits, and were rather improved at the end of the six weeks. I kept likewise during the same time forty hogs (swine.) The hogs had every day one bushel of offal barley, or bad beans, value 2*s.* 6*d.*

Improvement made.

	£.	s.	d.
The hogs improved, one with another, as far as I could judge, 2*s.* per week - - - - -	24	0	0
The horses kept upon this excellent food I value at 5*s.* per head per week - - - -	13	10	0
	37	10	0
Mowing and bringing home tares 1 10 0			
Corn for hogs, 2*s.* 6*d.* per day 5 5 0	6	15	0
Profit - - -	30	15	0

Clear profit 30*l.* 15*s.* for five acres of tares, including seed and once ploughing, which were but a small crop. I have had a considerable quantity more upon the ground. However, 6*l.* 3*s.* per acre for a fallow crop, as this evidently was, is no despicable profit. The land must have been naked fallow, had it not been for this crop; and from its being off so early, the land got a complete fallow of three excellent ploughings and harrowings, and was in good time sowed with wheat, which now looks very well, and

and the land, in my opinion, is not at all injured.

Experiment 2d.

Jan. 25, 1802.—This day, made an experiment to ascertain what culmiferous crop will pay the farmer best after potatoes. As there have frequently been a diversity of opinions on this point, the soil, which was a poor gravel, worth about ten shillings per acre, had borne the following crops:

1797. Naked fallow without manure.
1798. Barley with clover.
1799. Clover pastured, manured with eight tons of farmyard dung, well rotted, once ploughed, and sowed with wheat.
1800. Wheat.
1801. Potatoes, drilled at three feet, well horse-hoed, but without manure.
Jan. 25, 1802. Measured off three exact half acres, and sowed.
No. 1. Sowed with 3 bushels of oats; reaped Aug. 18.
— 2. Sowed with 2 bushels of barley; reaped Aug. 23.
— 3. Sowed with 1 bushel and a half of wheat; reaped September 4.

PRODUCE.

	£.	s.	d.
To 21 bushels of oats, at 2*s.* 6*d.* - - -	2	12	6
Seed and expences - - - - - - - - -	1	12	0
Profit on oats - - -	1	0	6
To 12 bushels of barley, at 3*s.* - - -	1	16	0
Seed and expences - - - - - - - - -	2	4	0
Loss on Barley - - -	0	8	0
To 9 bushels of wheat, at 7*s.* - - - - -	3	3	0
Seed and expences - - - - - - - - -	2	1	3
Profit on wheat - - -	1	1	9

I have here charged the prices for seed, and the price of the produce, as they then actually sold, which is no just criterion, and makes much against the barley, the seed of which was bought at 44*s.* and the produce sold at 24*s.* a price at which the farmer certainly cannot afford it. A given price should therefore be fixed upon: suppose, for instance, wheat 60*s.*, barley 36*s.*, and oats

oats 24*s.* the experiment will then stand as follows:

	£.	s.	d.
Oats 21 bushels, at 3*s.* - - - - -	3	3	0
Expences - - - - - - - - - -	1	14	6
Profit on oats - - -	1	8	6
Barley 12 bushels, at 4*s.* 6*d.* - -	2	14	0
Expences - - - - - - - - - -	1	14	6
Profit on barley - - -	0	19	6
Wheat, 9 bushels, at 7*s.* 6*d.* - - -	3	7	6
Expences - - - - - - - - - -	1	16	9
Profit on wheat - - -	1	10	9

The barley still not nearly so profitable as either the oats or wheat, though this is quite a barley soil. Another circumstance against the wheat is, its being sowed so late. On the other hand, some may imagine that the early sowing of the oats and barley was unfavourable to them; but that is not my opinion, as it is a dry soil, and worked well at the

time. However, they were all as good crops as generally grow upon such soils, which have received no better management. I have charged but one year's rent for the land, and nothing for manure, which, though it had none for this crop, yet something ought to be charged.

Experiment 3d.

Upon the same day, and on the same soil, I sowed, for comparison, two exact half acres with wheat, one broad-cast with one bushel and a half, the other drilled with Mr. Cooke's machine, at eighteen inches asunder, with two pecks and a half. The drilled received three hand-hoeings, with a common turnip-hoe, on the 24th of April, 8th of May, and in June. The difference in colour was very great, the drilled being of a deep green, as luxuriant as if growing upon the richest soil,

PRODUCE.

Bush. Pecks.			£.	s.	d.
Drilled - 11 0 at 56*s.* per qr. - -			3	18	9
Broad-cast 9 0 at ditto - - - -			3	3	0
			0	15	9
To saving of seed in the drilled at 4*l.* 4*s.* the price given - - - -	9	2			
	4	6			
Neat saving - - - - -			0	4	8¾
Superiority in favour of drilling			1	0	5¼

Superiority per acre in favour of drilling, 2*l.* 1*s.* 11½*d.* and the ground was certainly left in superior condition. Some may imagine I have undervalued the hoeing; but when I inform them it was hoed by the day, at 2*s.* per man, they will be well aware the men would not work too hard.

Experiment 4th.

The same day, and upon the same soil, I sowed, for comparison, two exact half acres with barley; one broad-cast with two bushels, the other drilled with

three pecks at eighteen inches asunder. Broad-cast ripe three days first, the drilled the same hoeings, and on the same days as the wheat. The luxuriancy of the drilled made strangers think it was wheat, nor were they convinced until it came into ear. I never saw such a flag upon barley, nor straw so strong.

PRODUCE.

	Bush.	Pecks.		£.	s.	d.
Drilled -	21	2	at 3s. per bush. -	3	4	6
Broad-cast	12	0	at ditto - - -	1	16	0
				1	8	6
Saved in the drilled, exclusive of hoeing and drilling - - - - -				0	2	4½
Superiority in favour of drilling only half an acre				1	10	10½

The difference is astonishing. Authors talk of drilled barley being unequally ripe, which was not the case with this. The barley had the largest body I ever saw, which certainly was one reason why it measured so well.

Experi-

Experiment 5th.

On the same soil an experiment was made to ascertain what month is most proper to sow barley in. Four exact half acres were measured, and sowed in the following manner with two bushels each:

No. 1.

Sowed 25th Jan. The ground worked well. Ripe Aug. 23.

No. 2.

Sowed 24th Feb. Did not work quite so well. Ripe Aug. 26.

No. 3.

Sowed 17th March. Worked very well. Ripe Aug. 28.

No. 4.

Sowed 19th April. Worked well. Ripe Sept. 14.

PRODUCE.

		Bushels.	Pecks.	Quarts.
No. 1.	January,	12	0	0
— 2.	February,	11	2	0
— 3.	March,	14	1	3
— 4.	April,	11	0	2

This experiment proves that March is the best, and April the worst month to

sow barley in. I assign as a reason for February being deficient, the ground working rather the worst. However, it worked as well as it may generally be expected to do in that month; a proof that judging by the eye is erroneous. The crops both of January and February looked better than those of March.

Experiment 6th.

On the same soil an experiment was made to ascertain the most proper quantity of seed barley per acre; the usual quantity here is four bushels. If you ask a farmer the reason why he sows four bushels, he replies, his great-grandfather, and all his ancestors, did the same, and of course it must be right. Now if his great-grandfather, and all his ancestors, made the same answer, it is evident that no improvement has taken place since the days of Adam;

Adam; and that, whether the soil be rich or barren, sowed early or late, the same quantity is uniformly applied. Five exact acres were measured and sowed with the following quantities of seed. They were all sowed the same day, March 17, 1802, except the drilled, which was sowed January 25.

		Bush.	Pecks,
No. 1,	Sowed with -	2	2
— 2,	——— -	2	0
— 3,	——— -	1	2
— 4,	——— -	1	0
— 5,	Drilled at 18 Inches	0	3

PRODUCE.

	B. P. Q.		B. P. Q.
No. 1, or 5 bushels per Acre	12 3 0	or per Ac.	25 2 0
— 2, or 4 ———	13 0 0	———	26 0 0
— 3, or 3 ———	11 2 0	———	23 0 0
— 4, or 2 ———	12 0 3	———	24 0 6
— 5, or 1½ ———	21 2 0	———	43 0 0

This experiment shows the quantity of seed, from two bushels to five, not to be of so much consequence as might be supposed,

supposed. I did not expect they would have come so near to each other; and I am unable to assign a reason why three bushels should be less than any other quantity. The superiority in favour of drilling is astonishing, and likewise cheaper than any of the others, except the two bushels.

Account of the Season 1802, *after the Crops were sowed.*

February.—More dry, and less frosty than usual.

March.—Bright, cold, cutting weather; but little downfall of any kind.

April.—Moderate showers, and one very wet day. My barley sowed in January looked very ill in this month.

May.—Exceedingly dry. Farmers in high situations wanted rain very much. Several very severe frosts for this advanced period.

June.

June.—Moderate rains at the beginning. The latter part dry and warm.

July.—Cold, and exceedingly wet throughout; so much so that almost all the hay was spoiled.

August.—After the first week it cleared up; and the finest harvest almost ever remembered succeeded.

I am, SIR,

Your obedient servant,

JOHN WRIGHT.

Pickworth, Rutland.

Mr. CHARLES TAYLOR.

Certificates accompanied the above paper from the Rev. R. LUCAS, Rector of Casterton, Pickworth; and GEORGE SESSON, of Essendine, in the county of Rutland, confirming the statement made therein.

The

The SILVER MEDAL of the Society was this Session voted to JOHN CHRISTIAN CURWEN, Esq. M. P. of Workington Hall, in Cumberland, for his extensive Experiments on Feeding Cattle with steamed Potatoes, from whom the following Accounts and Certificates were received, and to which Engravings and Descriptions are annexed.

SIR,

IN a letter, which I had the pleasure of addressing to you some time ago, I took the liberty of hinting at an experiment I was making, in giving Steamed Potatoes as a substitute in a great measure for Hay.

I was then wholly unacquainted with its having been tried. It was from my friend, the Bishop of Landaff, I first learnt

learnt that the Board of Agriculture had made a report upon it. As I do not find, that was carried to any great extent, nor given in the way I have done, I shall, with much deference to the Society of Arts, &c. offer what has occurred to me, together with the plan I have adopted for steaming and washing. Having nothing of the kind to assist me in my beginning, I found great difficulty and much time consumed, which I trust this will remedy to those who may be inclined to make the experiment.

My respectable friend and neighbour the Bishop of Landaff, took the trouble of examining the process, and inquiring into every thing relating to it, and has certified the complete success of the plan, and his approbation of the apparatus. It was in consequence of the alarming failure in the hay crop of the year 1801, that I found myself called

upon

upon to take some steps to prevent the serious consequences which were likely to result from it. The importations of hay from Ireland, in August, were from 9*d.* to 11*d.* per stone of 14 pounds. In this situation it fortunately occurred to me, that I had for many years given a proportion of Steamed Potatoes, mixed with the other food, to my hounds, and found it to answer extremely well. If hounds could stand their work with this feed, I could scarcely admit a doubt of its being a hard as well as nutritious food. Under this impression, I began my steaming in October 1801, and continued it till late in May. The prejudices I had to encounter were such as would have defeated the plan, had I not followed it up for some months with constant and unremitting attention; and whoever attempts it, will have difficulties to contend with, that require particular attention to overcome. In no one instance

stance did it fail, and my horses were never in such spirit and condition. In October last, I recommenced my operations, and am able to steam from 160 to 200 stone, of fourteen pounds each, per day; I have fed upwards of eighty horses constantly both seasons; and this year, I have extended the feed to my milch cows, taking away all hay, and only giving a little straw. Each horse has a stone and a half of potatoes, or twenty-one pounds, estimated at 3*d.* per stone — 4½*d.*; steaming, a half-penny; ten pounds of bruised corn, 6*d.* five pounds of hay, 2*d.*; two pounds of cut straw to mix with the corn, a half-penny; making on the whole 13½*d.* per day. Each tub of potatoes, containing eleven stone, has one of cut straw mixed up with it; it is given warm, and a horse will eat a stone in less than half an hour, whilst between six and seven would be required to eat a stone of hay. The

time gained for rest contributes greatly, I have no doubt, to promote the health and condition of the horses.

The facility with which potatoes can be transported from place to place, is much in their favour, and being without damage, to which hay is liable, is a further object. The individual gain will be found great, where ground is highly rated and not easily procured, as will be commonly the case where horses are most wanted. In a national point of view, it may be important, should the population of the country advance as rapidly as it has for some years past. The potatoe crop is produced from ground which would otherwise be under fallow; and when proper care is taken, the wheat after potatoes is equal, if not superior, to that from fallowed ground. The year previous to my adopting my present method, I sunk the rent of my farm, valued at a thousand pounds, (about

(about 700 acres) and seven hundred pounds besides. In the last year, I cleared, receiving the same prices for my work, 2189*l.* The only difference I can point out is in the price of oats; this might deduct 300*l.* I had forty acres last year under potatoes: the wetness of the ground, and the very unfavourable season, made my crop a bad one. I shall have this year sixty. I have found no difficulty in importing from Scotland and Ireland, at 3*d.* and 3½*d.* per stone. The quantity being more than I required, I have sold to the poor at reduced prices at 3*d.* whilst the markets were from 5*d.* to 6*d.* I had 300 acres under hay, and never sufficient: I expect that 150 now will be more than sufficient for all my wants. The value of hay was heretofore in proportion to my necessity; having no longer occasion for any, the price will fall to the neighbourhood. Indeed, it

has, as I might purchase at 6*d.* per stone, what was seldom or ever under 9*d.* and more frequently a shilling; I have every pound of hay weighed, so as to prevent all waste; and though this is some trouble and expense, I have reason to believe it is amply repaid by the economy it enforces.

I beg pardon for the unreasonable length of this letter. Without a considerable degree of enthusiasm, I should never have got through with my undertaking; and the Society will, I hope, excuse me, if I have attached more importance to the matter than it deserves. If any further information should be wanted, I shall be happy to give it.

With great respect,

I have the honour to be,

SIR,

Your obedient servant,

J. C. CURWEN.

P. S.

P. S. I make no difference in the feed of a cart horse, or one of my carriage horses; the allowance is the same. The coals for steaming 160 stone of potatoes, I have found to be two Winchester bushels and a quarter, or 137lb. of coal.

	£.	s.	d.
One labourer also is sufficient to steam, wash, &c. 160 stone	0	1	8
Two Winchester bushels, and a quarter of coals, at 3*d.* each bushel	0	0	7
	0	2	3
The cost is therefore under a farthing per stone, leaving a residue of 13*d.* per day, which in six months would produce	9	15	0
The cost of the apparatus, washer	12	12	0
Four tubs, at 2*l.* 2*s.* each	8	8	0
Boiler	5	5	0
Platform for the tubs	10	10	0
Pump	5	5	0
Building	60	0	0
	102	0	0

Belle Isle,
March 6, 1803.

To Mr. CHARLES TAYLOR.

SIR,

IN addition to what I have had the pleasure of communicating to you, on the subject of potatoes, I wish to add a few observations, to guard such as may be inclined to make the experiment of feeding with them, against the pernicious effects of the liquor which distills from the potatoe. The first attempt I made to give potatoes to hounds, was fifteen years ago: they were boiled with their other food; but I was soon obliged to desist from it, the hounds being very violently purged and affected by it; from this trial I was satisfied, that the potatoe liquor contained a very poisonous quality, which must be highly pernicious. Indeed, I have no doubt, if any animal was suffered to drink the water which comes from the potatoe, it would be destroyed

destroyed by it. It is upon this account, I adopted the leaden cistern upon which the tub rests, and into which the steam is introduced. Though I am satisfied there is a great loss of steam by it, and an increased expenditure of fuel, yet to keep clear of the potatoe liquor mixing with the potatoes, is of the first importance. As a remedy against the loss of steam, I should advise to lengthen the steam-pipe in the cistern, so as to throw the steam to the centre of the tub, and to have a hole cut, and covered with a leaden cap, with holes for the steam to pass through, by which means the condensation will fall by the sides of the tub, and much steam be saved. The potatoes are made much dryer, by suffering them to stand a few minutes in the tub, after the steam is taken from them.

I had so little assistance from any thing previously done in steaming, that

the first season, it required five men to do the work which one man can now accomplish with ease. It took two persons to wash them, which they did in a very incomplete manner; two to steam and bruise, and one man and a horse to furnish water. The washer will be found to answer the purpose admirably well; and when the saving of water is an object, its value will be increased. Several private families have adopted them upon a small scale, and found great convenience from it. I believe the method I have adopted of mixing a portion of cut straw, (from a tenth to an eleventh part) is highly advantageous; first, as it prevents the food passing too quickly, and secondly, as it keeps the mouths of the horses from being clogged with the potatoes. Should doubts still remain, as to the performance and health of the horses thus fed, I am ready to afford unquestionable

tionable proof from the persons who have the care of them. I shall always be ready to answer any questions, or to afford any further information in my power.

From what I have previously stated, the advantages I have already reaped from this method will be apparent; and I cannot but sincerely wish, both for the advantage of the public and individuals, that through the medium of your most useful and respectable Society, it may come recommended to them, which cannot fail of having considerable effect.

I have the honour to be,

SIR,

Your obedient servant,

J. C. CURWEN.

London,
March 12, 1803.

To Mr. CHARLES TAYLOR.

P. S.

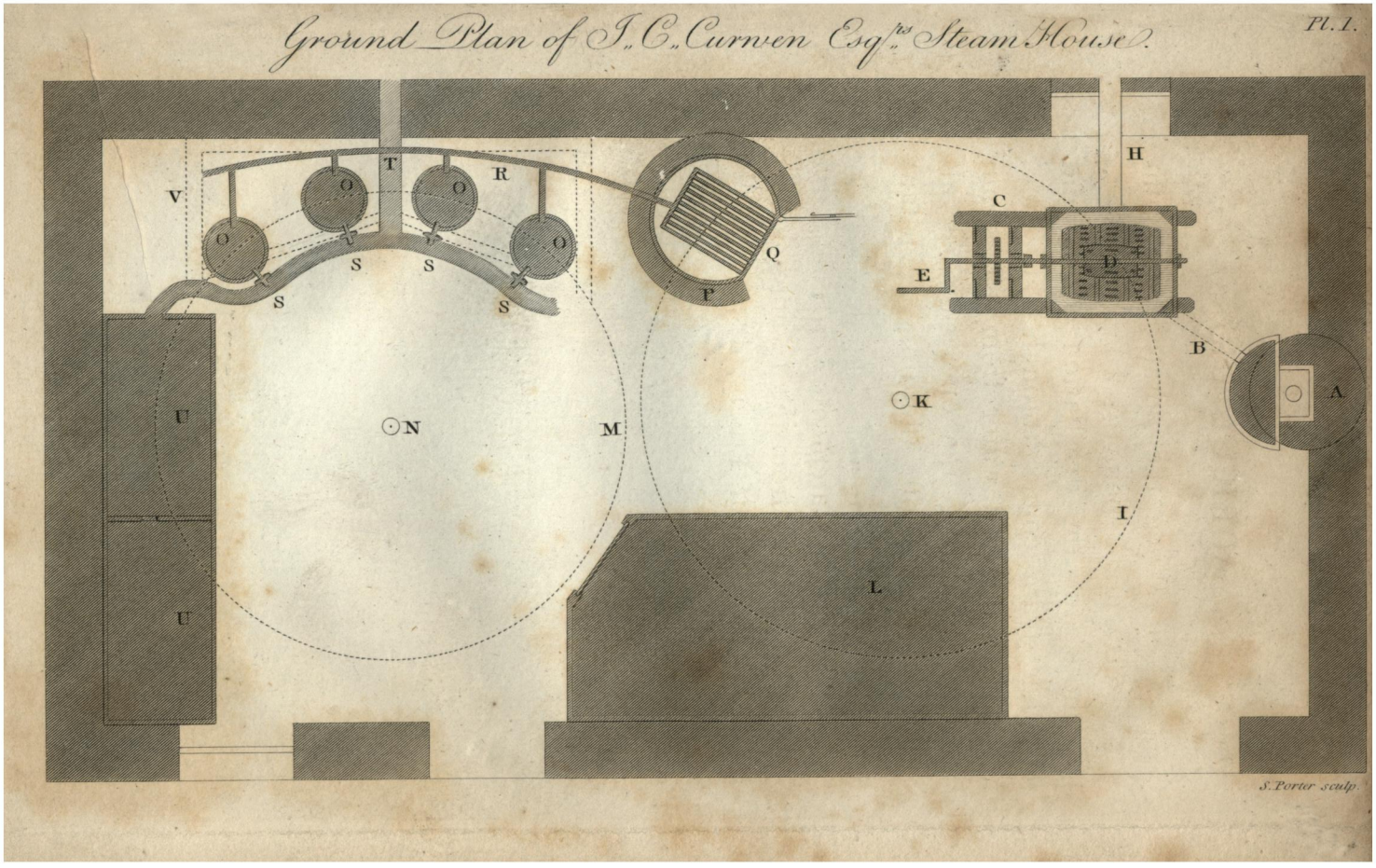
P. S. When the potatoes are sufficiently done, being of a heat equal to the steam, the distillation ceases, and the steam comes through the cock. The condensed water from the steam formed during the operation, is allowed to run off, affording a constant stream.

The above statements were confirmed by Certificates from the Bishop of Landaff, and Arthur Young, Esq.

Reference

Ground Plan of J. C. Curwen Esq.rs Steam House.

Pl. 1.



Reference to ENGRAVINGS *of* Mr. J. C. CURWEN'S *Method of* STEAMING POTATOES *for the Use of* CATTLE. *Explanation of Plate I. or the Ground Plan.*

A, The well from whence the water is furnished to wash the potatoes.

B, The spout which conducts the said water to the reservoir, where the potatoes are washed.

C, The frame of the potatoe washer, and reservoir of water.

D, A hollow wooden cylinder or barrel, hooped with iron, and perforated with oblong holes; it has a door at D, to allow the potatoes to be put in or taken out; it is of such a size, that eleven stone of potatoes will fill about two-thirds of it, which quantity it

it will wash in two minutes; it may be used six times, or wash sixty-six stone of potatoes, before the water in the reservoir be changed. When the potatoes are taken out of the water, either pump upon them, or throw a pail of water over them, and let it drain through them.

E, The winch or handle, which works the washer by means of a small pinion F, working in a larger toothed wheel G, occasioning one revolution of the washer from two of the handle, as shown more fully in the subsequent Plate.

H, The conduit, through which the dirty water is conveyed away from the reservoir.

I, The circle in which the crane K moves from its centre at K, and in

in tracing which circle the washing cylinder, when lifted from the water, is conveyed to the potatoe back or place of deposit L, which is raised from the floor the height of one of the tubs, or will meet one of them at the other circle M, so as that the other crane N, may convey the tub from thence to one of the lead vessels O, on which the potatoes are steamed.

P, The brick work of the water boiler in which the steam is formed.

Q, The grate on which the fire is made.

R, The leaden steam pipe, one and a half inches diameter, a branch from which enters each of the vessels O O O O, made of sheet lead, and on which vessels the tubs containing the potatoes stand whilst steaming.

S S S S,

S S S S, The cocks, which let out the water condensed from the steam, and impregnated with the juice of the potatoe.

T, The conduit which conveys away the water.

V, The frame-work or stillage, on which the leaden vessels stand, about ten inches higher than the floor.

U U, The stone troughs, in which the potatoes are bruised after being steamed, and before they are given to the cattle.

Explanation of Plate II.

C, The back or reservoir of water, for cleansing the potatoes.

D, The wooden cylinder or barrel, which, by turning the iron axis extending through it, washes the potatoes contained in the cylinder;

der; it is here shown in the state ready to be raised by the crane and jack K, from the dirty water; it can be disengaged from the toothed wheel G, by a jointed notch between the head stocks at W.

E, The winch handle.

F, The smaller pinion.

G, The larger pinion on a line with the axis of the cylinder.

X, A water back or cistern above the boiler, supplied from the pump Y, by the spout Z.

N, A crane and jack, by means of which the potatoes, when washed, are conveyed to the steam vessels.

No. 1 1 1, Three of the wooden steam tubs, with perforated bottoms, placed on the leaden steam vessels or cisterns O O O.

2 2, The

2 2, The boiler for the water formed of two iron pans, screwed together by two flanges; each pan is in capacity forty gallons.

R, The leaden pipe, which conducts the steam from the boiler to the steam vessels.

OOOO, The four leaden steam vessels, each twelve inches diameter, and nine inches deep; one of them is shown separate from its wooden tub.

3, A cock which conveys the water by a pipe from the reservoir, to nearly the bottom of the boiler.

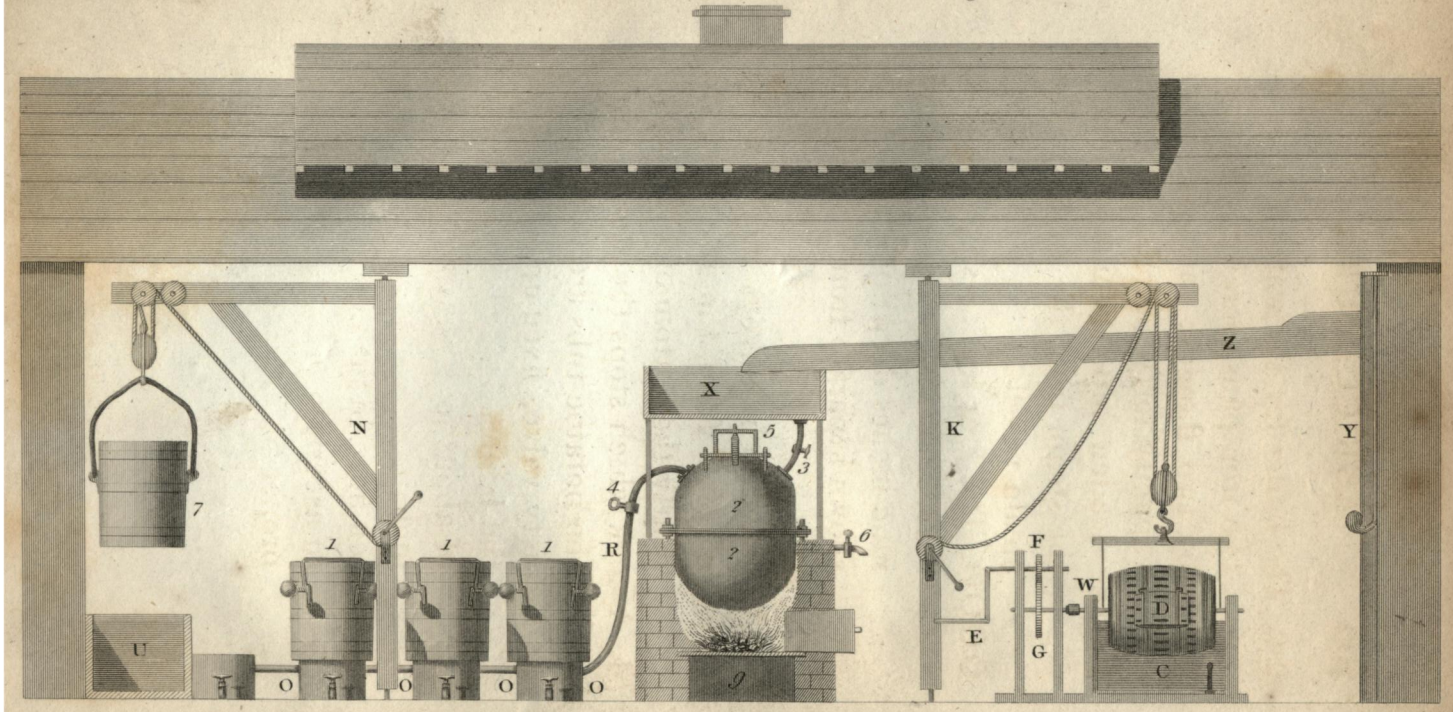
4, A cock which stops the steam, when the potatoe tubs are taken off.

5, A safety valve, fixed upon the top of the boiler, loaded with a weight of about four pounds to a square inch.

6, A cock fixed in the side of the boiler, to ascertain when it contains a proper quantity of water.

7, One

J.n C.n Curwen Esq.r.n method of steaming Potatoes.



S. Porter sculp.

7, One of the potatoe tubs detached from its lead vessel: it is two feet high, twenty inches wide at the top, and seventeen inches at the bottom; it will hold eleven stone of potatoes. The boiler will steam sufficiently the four tubs of potatoes, in fifteen or twenty minutes time; and if the whole are not in use, the lead pipes of those not wanted may be plugged up. Each tub and cover is held down by four levers, and an iron ball at the end of each lever.

When the potatoes are sufficiently boiled by the steam, the crane N raises and removes the tubs from their places to the stone troughs U U, a section of one of which is given: the potatoes are there bruised for use.

The Thanks of the Society were this Session presented to the Rev. WILLIAM PIERREPONT, of Burton Park, near Petworth, in Sussex, for his Experiments on preparing Potatoes in Digesters, for feeding lean and fattening other Stock; from whom the following Account and Certificate were received.

SIR,

THE object of the Society for the Encouragement of Arts, &c. being the general benefit of the community, I send you the following method of preparing potatoes, for the purpose of both feeding lean, and fattening other stock; conceiving and hoping from the experiments I have already made, that it will contribute something to the end which

which the Society has in view. Not altogether satisfied with the system of curing or preparing potatoes by steam from heated water, which I had practised, and conceiving that some better method might be found out, I made several experiments in the year 1801, and bestowed great attention and pains, before I brought the following plan to bear.

I have half a dozen common six-gallon iron digesters, which are filled with potatoes, either fresh washed from the water or dry; for I cannot find that their being in a wet or dry state makes any difference. They are then put into an oven, the bottom of which is a *cast iron* plate, three feet ten inches long by two feet ten inches wide; under which is the fire divided into three parts. Of this, the middle part, or division, is eighteen inches: the two other divisions are ten inches each: the remaining eight inches rest upon the brick-work. The

heat is conducted, half one way, and half the other, round the sides of the oven to the mouth, which is nearly eighteen inches square, and then over the top, uniting in the chimney, in which is placed a damper. There is also an iron rod, with a segment of a circle at one end, for the purpose of pushing the digesters into the oven from the mouth, and a hook at the other end, to draw them back to the mouth when done. The first round, that is, the six digesters first put into the oven, take about two hours in baking, supposing the fire not kindled before they are put in; and every round after the first may be done in little more than an hour. This process requires very little fuel, and by no means the attention or the force necessary for steaming; as the potatoes will be done quicker or slower in proportion to the heat applied, without any of it being lost for want of greater force; even one round left in the

the oven over night, with a mere trifle of fuel, will be done the next morning: but I do not allow that to be done, because it turns the potatoes black, and hurts the digesters. Observe, the digesters must occasionally be rubbed on the inside, with a little lard or dripping. Potatoes cured this way, are not by any means so apt to turn sour, or scour the cattle, and are more dry; so that the animal fed with them drinks much more, and they become harder when cold, so as to be flung to the stock with more convenience, than when steamed.

In the year 1802, I fattened fifteen brace of bucks chiefly with them; I say chiefly, for after the potatoes were gone, they had a few beans. They were very fine and peculiarly well flavoured. Biggs, at Temple-Bar, had thirteen brace of them. I also fattened, the same year, with them, two oxen, three cows, and two pigs, which were

equally well flavoured, particularly the fat; the pigs had, towards the latter end, a few whole peas after each meal; the bucks had six pounds per day each, at an average; the lean deer in the park, do very well with little more than a pound per day, instead of hay. This year, that is, within the last seven or eight months, I have fattened two very large oxen, and twenty Welch wethers; the wethers, with which there were two South-Down rams, and one ewe, had eighty pounds of the potatoes per day, with a little cut hay. The ewe was put with them to teach the other sheep to eat them: she has since had twin lambs; and the bailiff acknowledges, that the lambs do better than the others at turnips; though he, with some other persons, dissuaded me from trying more ewes, under the idea that the potatoes would dry up their milk. Four dairy cows never did so well with very good hay, as they did last winter, with

with about four pounds of the potatoes, and about five pounds of rubbishy hay and straw cut. But enough on this head.

The Earl of Egremont had two of the Welch wethers, and a sirloin of beef from one of the oxen. The other, for sale, on the 22d of March, weighed 343 stone; he has had about forty pounds thrice a day. I take the liberty of referring to Lord Egremont for the flavour of the meat. He has seen the process; and I shall request the honour of his Lordship's transmitting this to you, in case he thinks it deserving the Society's attention.

I am, SIR,

Your obedient servant,

W. PIERREPONT.

Burton Park, near Petworth,
28th April, 1803.

CHARLES TAYLOR, Esq.

I know nothing of the expense of preparing potatoes in this manner; but I am inclined to think, that they are more nutritious than in any other mode of dressing. I did not think it possible to bring such large oxen to such a state of fatness upon potatoes.

EGREMONT.

SIR,

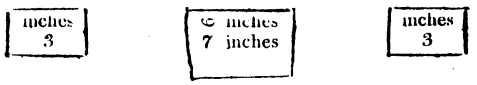
WITH all due acknowledgment to the Society of Arts, &c. for the honour they have done me, as communicated to me in your letter of the 27th instant, and which came to hand yesterday, I could wish the subjoined additions to be made to the account you already have. My reason for wishing it is, that any person willing to try the method in question, may profit by the general result of the many and various experiments I made, without being at the

the expense and very great pains I was at, before I could bring it to bear in its present form. I had not the most distant idea of using digesters at the onset of the business; neither had I, nor have I any interested motive in view, either for myself, or any other person, or indeed any motive than the benefit the public might derive from it. I have deemed it necessary and proper, both out of respect to the Earl of Egremont and myself, to make the above declaration and remark, on this occasion. The following experiment was made, for the Earl of Egremont, to ascertain the quantity of fuel, &c. as per date.

At Burton Park, 21st of May, 1803, three bushels of potatoes were weighed separately, (each bushel weighing sixty pounds) before they were put into the six digesters. The potatoes from the two first digesters, taken out of the oven, when baked and weighed toge-

ther,

ther, were fifty-five pounds; those from the two next were fifty-four pounds; and those from the third two, were fifty-four pounds. The carpenter measured the wood with which they were baked; and he tells me, that a cord, or stack of good fire-wood well piled, (that is, wood cut into three-feet lengths, and piled twenty-four feet in length, and one foot ten inches in height, and which is sold in this neighbourhood for 12*s*.) will bake ninety sets, or ninety times six digesters full of potatoes, at the rate of wood it took to bake the above six, which was the second set that day. A cast-iron plate, five feet in length, instead of three feet ten inches, by two feet ten inches, will hold eight digesters, and by adding a small fire, thus,



on each side of the great fire-place, will, in my opinion, accelerate the baking

baking from fifteen to twenty minutes, in every set, as well as be some saving in fuel; because the side digesters generally take that time longer than the centre one. The merit of this process does not consist in slow simmering; for, the quicker the potatoes are done, provided proper attention is paid to them, the better. With the four following observations adhered to, any person may exercise his own judgment, and indulge his own information and fancy in erecting his oven, whether it be for a greater or smaller number of digesters, and according to the quantity of potatoes he may wish to bake.

1st, The digesters, or other vessels containing the potatoes, must not be in contact with the fire. 2d, The said vessels, even placed on cast iron, must have legs, so that the bottoms of them do not touch the cast iron. 3d, The lids must be steam-tight, in order to prevent its escaping before the potatoes

are

are nearly done, with valves, if not the same, something similar to those of the digester. And 4th, the external air is to be excluded from them; and the more effectually that is done, the better; both for saving fuel and time, as well as to prevent their burning. I have never had occasion for more than six bakings in a day; which six bakings, that is, six sacks or eighteen bushels, at sixty pounds the bushel, were done within twelve hours. The father and his son had 12*s*. per week, for getting from the heap, washing and baking the potatoes, cleaving the wood for ditto, and feeding stock; 1080lbs. of potatoes, are baked for little more than six parts out of ninety of the cord, or stack of wood, above described. My opinion is, that two ovens of six or eight digesters each, (according to the quantity of potatoes wanted) would answer the best purpose; particularly where coals would be used, or the wood

is

is ready cut; for then the same person could attend both, and one would be baking whilst the other was emptying and filling, and this whether for a great or small quantity. Perhaps two ovens erected together, with a single brick laid flat to divide them, with two fires at the end, so that each flue would go the whole length of the plate, mounting at the other end, and so over the top into the chimney, and the two doors of them at the two fronts, would answer very well in point of economy, &c. Perhaps also an orifice just above the mouth of the oven, or in the door, with a moveable valve fixed to it, would prove useful, so that the steam which issues from the valves of the digesters, about ten or fifteen minutes before the potatoes are done, and which smells like that from roasted potatoes, might escape by it, instead of by the mouth of the oven. The above steam is attended by a hissing noise, and a kind

of

of boiling commotion in the digesters, which the person attending them will very plainly hear on opening the door a little. When he perceives that noise, &c. begins to intermit, the digesters must be taken out, or the potatoes will burn at the bottom, and that in proportion to the degree of heat under them. A very little observation will soon make a person acquainted with the proper time of drawing them. The Society for the Encouragement of Arts is at full liberty to publish what they think may be useful from what I have written; for public advantage is my grand object, as well as it is theirs.

I remain, SIR,

Your most obedient servant,

W. PIERREPONT.

Burton Park,
30th June, 1803.

CHARLES TAYLOR, Esq.

The

The SILVER MEDAL of the Society was this Session voted to the Rev. EDMUND CARTWRIGHT, of Woburn, in Bedfordshire, for a three-furrow Plough, of his invention. The following Communication and Certificates were received from him.

A Drawing and Description of the Plough are annexed, and the Model is placed in the Repository of the Society.

DEAR SIR,

I ENCLOSE you a Certificate of the performance of a Plough of my invention, which has occasionally been at work through the whole summer. For this last fortnight, it has been used for ploughing in wheat under furrow. Though a very useful instrument at all times,

times, it is particularly valuable at the seed times, and the turnip season; because at those times it frequently happens you lose the most favourable opportunities, for want of ability to execute your operations with sufficient dispatch.

I need not calculate to you the saving on the use of this plough. It is worked (on light land I mean) with a pair of horses, without a driver. A pair of horses and a ploughman cannot be laid at less than 8*s.* per day. As two sets of these are saved, the weekly saving by the use of this plough amounts to no less than 4*l.* 16*s.*

Useful, however, as I find this instrument on our light level lands, I am not so partial to it, to suppose it is equally calculated for all soils, or all kinds of ground. For instance, where the ground is very uneven, or the ridges are narrow and steep, I would not use it; neither when the land is very foul with

with root weeds. In all these cases a single plough is certainly to be preferred: but in all cases where the ground is in a tolerable state of cultivation, and where it lies reasonably level, it will be found a most valuable acquisition.

I will thank you to communicate this Letter, and the Certificate accompanying it, to the Committee of Agriculture; and if they are disposed to think favourably of this invention, I will send you a model for their inspection.

I am, dear SIR,

Your very obedient servant,

EDMUND CARTWRIGHT.

Woburn, Oct. 20, 1802.

CHARLES TAYLOR, Esq.

THIS is to certify, that the three-furrow plough invented by the Rev. Edmund Cartwright, ploughs a surface of twenty-seven inches each bout, and that on light land a pair of horses regularly ploughs three acres per day with it in a workmanlike manner.

JOHN DUCKITT, as Bailiff to his Grace the Duke of Bedford.
WILLIAM BAXTER, Assistant.

June 21st, 1802.

DEAR SIR,

YOU herewith receive the model of my three-furrow plough.

The saving of hands, and consequently of expense, in a plough of this kind, is obvious; but why there should be a saving of power, may require to be explained.

I need

I need not observe to you, nor to any man who considers the action of a common plough, that a very material part of the labour in ploughing, arises from the friction of *the land side* and *the sole;* of the one against the side of the furrow, of the other against the bottom. In a single plough a certain length and width are required in those parts of it, to make it go steady; and even then the effect would be imperfectly obtained, did not the ploughman assist by the leverage of the handles of the plough. Hence it is clear, that the less disposition any plough has to follow the draught in a strait line, the greater is the labour of working it, because the ploughman in that case is to exert a greater power of leverage to keep it steady. On the contrary, when two, three, or more ploughs are combined, they serve to steady each other, and require comparatively very little power of the lever to keep them in a strait line.

Under these circumstances, neither the first nor second plough has any sole or land-side whatever; and even the third does not require so much of either as a single plough. I calculate the saving of power from this consideration alone, as equal at least to one plough. What farther power is saved, I attribute to the lightness and compactness of the instrument.

I am willing to think the simplicity of its construction, and the manner of fixing the plough (consisting but of two parts) to the beam, will not escape your observation. When the cutter (for as it is both coulter and share, I can give it no other single name) requires to be sharpened, or new-laid with steel, by drawing the two bolts the whole is set at liberty.

I make the ploughs to fit each beam indiscriminately; because when the land is too strong, or too foul, to work the three, I take off the second plough, and transfer the third into its place.

You

You will observe the centre of the whiple-tree shifts. By this contrivance, the power of the horses is equalized, though they may be unequal in strength, the longer lever being given to the weaker horse.

Should the Society wish for any farther information, it will give me pleasure to furnish them with it.

I am, dear SIR,

Very truly and sincerely, yours,

EDMUND CARTWRIGHT.

Woburn,
December 14, 1802.

CHARLES TAYLOR, Esq.

REFERENCE *to the Engraving of the* REV. EDMUND CARTWRIGHT'S *three-furrow Plough.*—Plate 3. Fig. 1, 2.

Fig. 1. A. B. The two wheels of the plough, the wheel B being full one seventh in diameter larger than the wheel A.

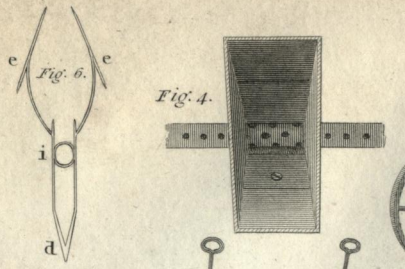
C D E, the three beams of the plough, of which C is the shortest and E the longest: these beams are fixed in the strong cross piece F, at equal distances from each other, and braced by another cross piece from C to E.

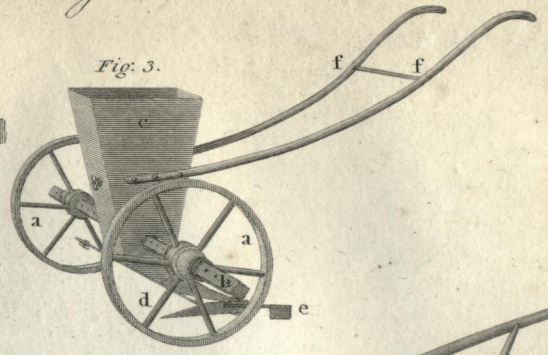
G H I, the three cutters which answer the purpose of both coulter and mould-board, each being formed together, or made of one piece of beaten iron. Each cutter is screwed to its beam by the flanging-iron K.

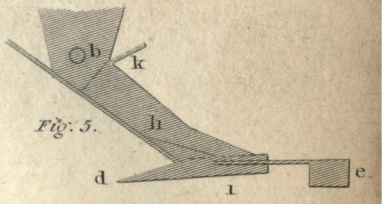
L M, the

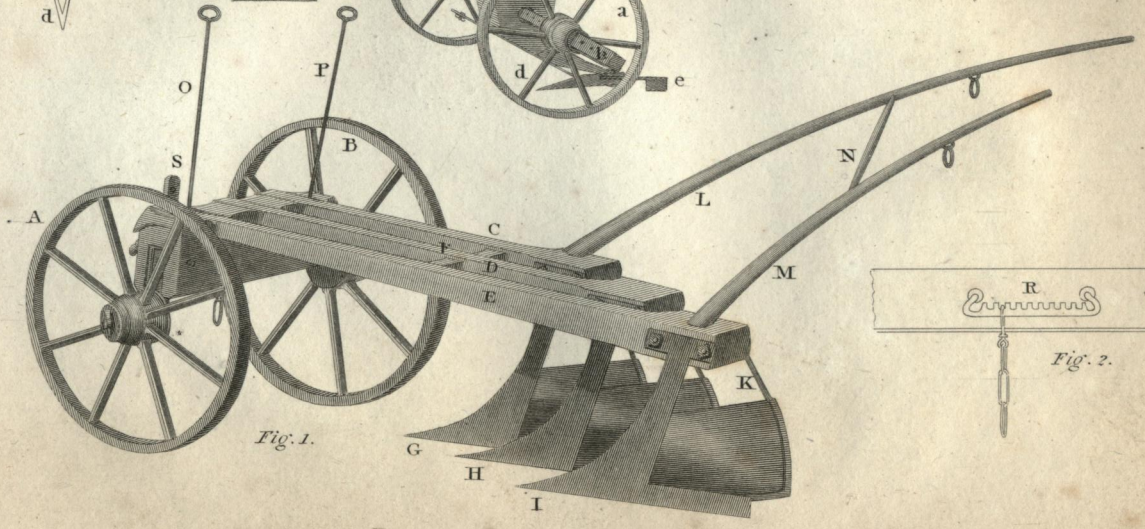
Pl. III.

Mr. Robert Greens Hand Drill for Peas &c.









The Revd. E. Cartwrights three furrow Plough.

Clint del.t

S. Porter sculp.

L M, the two handles of the plough, the lower extremities of which are fixed in the two outer beams C E, and connected by a cross piece N, to make them firmer. The handle L is longer than the handle M, in the same proportion as the beam C is shorter than the beam E.

O P, two upwright pieces of iron fixed in the cross piece F, having two holes at their summits for the reins to pass through which guide the horses.

S, an iron bar which slides up and down near one end of the cross piece F, to raise or lower the wheel A.

Fig. 2. Shows a detached portion of the strong cross piece F, to explain the manner in which the whiple-tree shifts (R) are fixed in front of that cross piece, so as to regulate or equalize the power of the horses.

S, a bar of iron, the lower part of which forms the axis of the wheel A, the upper part slides in a groove, in the cross piece F, and has holes at different distances. It may be retained at any height by an iron pin T, which passes through the cross piece, and one of the holes of the iron bar. The real plough is nine feet long to the extremity of the handles, and each cutter turns a nine-inch furrow; from centre to centre of the beams, being nine inches.

The

The SILVER MEDAL and TEN GUINEAS were this Session voted to Mr. ROBERT GREEN, of Westwratting, in Cambridgeshire, for his invention of a HAND-DRILL, for sowing Peas, Beans, &c. from whom the following Communications and Certificates were received.

A DRAWING and DESCRIPTION of this Machine is annexed, and a complete Machine is placed in the Repository of the Society.

SIR,

I HAVE invented an engine to sow peas, with which I have sown all my peas, to the amount of 40 acres, at the price of 1*s.* per acre, and think that my peas are much better than those sown any other way. It is also on a very simple plan, and the expense of it

it when complete is not 2*l*. It is used by manual labour, without any horse; and it will draw the drill, sow the peas, and cover them at the same time, and will sow them much rounder than any other I have yet seen. I likewise find I can do it much cheaper than with any horse, and am of opinion that it sows much better than any drill I have seen. If the Society wish it, I will send a model for their inspection.

I am, SIR,

Your obedient Servant,

ROBERT GREEN.

Westwratting, Cambridgeshire,
June 27, 1802.

SIR,

I HAVE sent the engine for sowing peas, in order that it may be laid before the Society for the Encouragement of Arts, &c. I intended to have sent

sent a model of it, but afterwards thought that the engine itself would be more acceptable to the Society. I made it myself, and have sown with it 26 acres of land in my own occupation. Mr. Piper, a near neighbour of mine, has sown with it five acres; and Mr. Cock, of Blunt's Hall, Wratting, in Suffolk, 25 acres, at the expense of 1*s.* per acre. Several other gentlemen had drills of me for sowing peas. If I give my men 1*s.* 6*d.* per acre, they will sow for me two acres in one day. I can with my own hand sow one acre in five hours, and at the same time sow the peas, draw the drill, and cover them, and make full twelve drills and a half to the rod. I likewise produce the plant much handsomer than any other seen in our country, and at a very trifling expense. By this engine too, the labour of horses is spared, which we find to be a very material circumstance. It will be a most excellent engine for gardeners in the

the neighbourhood of London; for I will be bold to say, that no man can sow with his hand, so as to equal this, at a very trifling expense.

I have spent much time in making implements of husbandry, but have made none so useful as this; for it is simple in its construction, may be purchased by any man, the expense being so trifling, and saves the labour of horses.

I remain, SIR,

Your most obedient Servant,

ROBERT GREEN.

Westwratting.

CHARLES TAYLOR, Esq.

DESCRIPTION

DESCRIPTION *of the* ENGRAVING *of Mr.* ROBERT GREEN'S *Hand-Drill, for sowing Peas, Beans, &c. Plate III.*

Fig. 3. *a a*, The wheels placed upon a wooden axis *b*, which is square at each end, but round in the centre. The square ends of the axle have holes throughout them, at different distances, in order to deposit the seed at nearer or more distant intervals, as may be wanted.

c, The box in which the seed is placed: the axis *b* is cylindrical, and has holes made therein proper to receive the seeds, which by the revolution of the axis are carried forwards, and fall through an iron tube into the interstice in the ground opened for them by the share *d*. When deposited in the ground, they are covered, or the earth drawn over them by two iron pins

pins or scrapers *e*, fixed on each side of the tube, and extending some inches behind it.

ff, The handles of the drill-machine, by which it is pushed forwards.

Fig. 4. Shows an enlarged view of the interior of the seed-box *c* above mentioned, and holes for the seeds placed in a spiral line, in order to drop the seeds more regularly.

g, Is a small brush within the box, which rubs against the cylinder, to keep the holes clear to receive the seeds.

Fig. 5, Is a section of the machine, where *a* is part of the seed box; *b*, the round part of the axle, which delivers the seed.

d, The share which opens the earth.

h, The tube through which the seed falls.

i, The mouth of the tube, and one of the fins which draws together the soil, and covers the seed.

k, Is

k, Is a small door, to be opened occasionally, if the roller or tube are out of order.

l, A strong flat board, to which the iron work is screwed.

Fig. 6. Shows an enlarged plan of the iron work, when the machine is reversed.

d, Is the share.

i, The hole from which the seed is dropped.

e e, The two fins, or scrapers, which collect the earth and cover the seed.

N. B. The length of the upper rim of the seed-box of the machine in *Fig.* 3, being fifteen inches, will serve as a standard for the measure of the other parts.

WE, the Undersigned, do certify, that Robert Green, of Weswratting, in the County of Cambridge, farmer, did invent a drill for sowing peas, that answers the purpose of facilitating and finishing the work in a better, cheaper, and more economical way, by far, than we have seen before; and we esteem and approve of it as a material improvement, as witness our hands as under.

A List of Persons who have used the Drill, and of the Quantity of Acres sown by them.

	Acres.	
Robert Green - -	42	at West Wratting, Cambridgeshire.
Mr. Piper - -	9	Ditto Ditto.
Mr. Cock - -	25	at Blunt's Hall, Little Wratting, Suffolk.
Mr. Drew - -	10	at Shudy Camp, Cambridgeshire.
Mr. Thos. Whitehead	8	at Finchingfield, Essex.
Mr. Sam. Whitehead	6	Ditto Ditto.
Mr. Linsdle - -	8	Ditto Ditto.
Mr. I. Green - -	5	Ditto Ditto.

Signed

Signed by Persons who have witnessed the Operation of the Drill, and approve of it.

C. Cocke - -	Blunt's Hall	
Dean Piper - -	Westwratting - -	Farmer.
Henry Frost - -	Westwratting Hall	Ditto.
Wm. Cowl - -	Ditto - - -	Ditto.
Wm. Dear - -	Ditto - - -	Ditto.
Richard Dean -	Ditto - - -	Ditto.
Tho. Whitehead -	- - - -	Carpenter.
John Beeton -	Westwratting - -	Ditto.
Wm. King - - -	- - - -	Ditto.
Houghton Spencer	- - - -	Ditto.
John Green - -	Finchingfield, Essex	Ditto.

The SILVER MEDAL of the SOCIETY was this Session presented to Dr. H. AINSLIE, of Dover-street, London, for his PLANTATIONS of TIMBER TREES, near the Lakes of Windermere and Coniston, from whom the following ACCOUNT and CERTIFICATES were received.

SIR,

THE following table shows the numbers of the different sorts of forest-trees, which I have planted since March 1789, and also the number planted in each year.

	1789	1790	1795	1797	1799	1800	1801	1802	
Larch	1000	3000		3500	20,000	39,500	1200	23,600	91,800
Scotch Fir	2000	12,300		1500	1300	3850	3500	9200	33,650
Oaks		3600				500	1600	5500	11,200
Ashes		2500	500						3000
Elms						200	1200		1400
Beech			200					500	700
Spruce Fir								100	100
Silver Fir								100	100
Total	3000	21,400	700	5000	21,300	44,050	7500	39,000	141,950

I have

I have desired the Certificates accompanying this to be sent, in order to refer to the present state of the whole of the plantations. Being less anxious to receive a medal from your Society, than to encourage others by my example, I am desirous of showing you at one view the result of thirteen years experience; and having tried every kind of soil and situation within my reach, I can no longer entertain any doubt of the success of any plantations I may in future make, and which, I can assure you, shall very much exceed those I have already made. I live at too great a distance from my plantations, to see them oftener than once in four years. They are situated on a high ground between the Lakes of Windermere and Coniston, and are exposed to every wind that blows. For some years I contented myself with filling up vacancies in different coppices, and planted 50,000 trees on land which

produced nothing, and without any expense of fencing. Having thus felt my way, I planted, in 1800, an inclosure of eighteen acres, adjoining to a common, and not worth two shillings an acre, already completely fenced. This plantation is in the most flourishing state; and I am at this time planting an inclosure of the same size and quality adjoining to it. Last spring I fenced off, from the most elevated and exposed inclosures, portions of about four acres each, (in all, about eighteen acres); and, in addition to the certificate of Mr. Fleming and Mr. Clarke, they inform me, that no plantations in the country are to be compared with the flourishing condition of this; which is the more remarkable, as the frost, on the 15th of May last, with the succeeding dry East winds, for above three weeks, threatened their utter destruction. I am therefore the more fully persuaded of the judgment of the person

person who planted, and the great facility of rearing forest-trees in such situations. In the best land, I have directed a larger proportion of oaks, elms, and beeches: in the most exposed, there is a very great proportion of Scotch fir. In fact, I use the firs merely as shelter; being convinced, that a fir of forty-five years growth does not contain more cubical feet than a larch of thirty. The average value of the land I have planted does not exceed 1*s.* 6*d.* per acre; which, added to the expense of the trees, the fences, and labour, makes the whole expense of planting 1000 trees less than two guineas; and these are upheld by Mr. Clarke, the planter, for three years. Many portions of land were over-run with long heath, savine, and furze, with a surface so broken, and a soil so bare, that if I had not seen flourishing plantations, four years old, growing upon them, I could not have believed

it possible. The only merit I claim consists in having ascertained, that even upon such stony ground, larches annually shoot between two and three feet. I suspect, that if the soil is dry, the height of situation is of no consequence for larches. I have observed, with anxiety, an insect do much mischief to larches, and one of above twenty years growth killed by it. Bergman has written a paper respecting it; but no means have hitherto been tried, in Sweden, to prevent its ravages. The only plantation of mine that has suffered at all from it, was one of about half an acre, in the centre of a coppice, deprived of air, and drawn up to a very great height. I have no doubt these trees were unhealthy; and as the surrounding wood is cut down, I shall not fail to observe if any changes take place.

I shall also observe whether any admixture of other trees with larches prevents

prevents the inroads of these caterpillars. This point ought to be ascertained, as many large plantations of larches in Lancashire and Cheshire have suffered by them; and it is doubtful whether the larch has not formerly lost its credit in this Country, by inattention to its habits. Wherever these caterpillars are found numerous, I suspect the trees are unhealthy from their being in an unsuitable soil, or confined air; and I have always observed them most numerous in the lowest branches, which the tree seems desirous to throw off.

I may also mention, as it in some measure comes within the views of the Society, that oaks and ashes do not thrive well with me when planted alone. I have therefore permitted them to fix their roots for three or four years, or more, and then ordered them to be cut close to the ground; and larches to be planted among them. The whole of

the plantation then grows up uniformly, and the oaks and ashes thrive uncommonly, many of them shooting six feet in three years.

I have for many years left a considerable number of the best oaks and ashes in the coppices I have cut down. Within the last three years, I have left upwards of 5000 on about fifty acres. Whether all or any of my speculations may succeed, I know not; but my own ideas accord very closely with the views of your Society, and I rely more upon their judgment than my own. I have not yet begun to thin my plantations; but as they principally consist of larches and Scotch firs, and as what I cut down will be converted into charcoal, I should be glad to know if any person has found it worth while to collect the turpentine in the process, which appears to me not only to be easy to do, but likely to produce considerable profit.

profit. I beg pardon for this long detail, and am, with much respect,

Your very obedient servant,

H. AINSLIE.

P. S. The trees, with very few exceptions, are planted four feet asunder.

Two Certificates accompanied the above statement; one from Mr. Thomas Clark, nurseryman, of Keswick; and the other from the Rev. John Fleming, Minister of Troutbeck, and the Rev. Thomas Clarke, Curate of Satterthwaite: they show that the trees are in a flourishing and thriving condition; that they are in general fenced with stone walls, eight feet high; and that the land on which the plantations are made is of a rocky barren soil, intermixed with patches of peat-moss, and in general of little value.

The

The SILVER MEDAL of the Society was this Sesson presented to BENJAMIN WADDINGTON, Esq. of Lanover House, near Abergavenny, in South Wales, for Improvements of Boggy Land, from whom the following Account and Certificates were received.

SIR,

I WAS not aware that communications respecting plantations of trees were to be made on or before Tuesday next, the 28th instant, until I called at the Society's house in the Adelphi, a few days ago. The following account, therefore, of my plantation is not so worthy of the Society's attention as I should have made it, had I been able to return from London sooner than this day. If the Society think fit to honour me with any queries on the subject, I shall be happy to transmit every particular that, from

from the hurry in which I write, I may in the following statement have omitted.

Having, in the year 1798, determined to plant with larches, ashes, &c. about twelve acres of pasture-land, situated not far from my house, the soil of which is gravelly and partly boggy, and which had not been by any means productive, I ploughed it up, and obtained from it that year an indifferent crop of potatoes. It being bounded on the lower side by a brook, I had a bank thrown up; and in November 1798 I made a willow fence, such as Dr. James Anderson has recommended in his "Essays on Agriculture," &c. &c. In March 1799 I received from Glasgow 108,000 larches, and 5000 ashes, part of them being seedlings, and part transplanted. I had the larches put into the ground as soon as possible, two feet apart, in rows, as recommended by Dr. Anderson, in his third volume of Essays.

Essays. The 5000 ashes, and 2000 more which I procured in this neighbourhood, I planted according to the judicious method recommended in Article 22 of the 5th Vol. of the Bath Society's Papers, &c. I state it thus concisely, from not having time to describe the method more fully. A considerable number of the larches having been much injured in a long passage from Glasgow, in December 1799 I procured 12,000 transplanted ones, to fill up vacancies; and in another part of the same ground I planted 2000 spruce firs by themselves, two feet apart, and 1000 Spanish chesnuts likewise by themselves. Part of the ground being still unoccupied, in October 1800 I ordered from Glasgow 21,600 more larches, which arrived in February 1801, and were immediately planted. Several of them having died in the course of that year, I procured, in December 1801, 14,400 more, and

2,400

2,400 English or Scotch elms. The larches were made use of to fill up vacancies, and a part of the ground that was still unplanted; and the elms were put into the ground principally near the hedge-rows round the plantation, and other parts of my estate. All those that came last were transplanted trees, from one and a half to two and a half feet long; and having arrived in excellent order, they have completed the plantation, excepting about a quarter or half an acre, at present a bog, which it is my intention to cut drains through, and to plant with ashes this winter.

I have the pleasure to inform you, that the whole, or nearly the whole, of the larches and ashes, appear now to be in a very flourishing state, some of the former being twelve feet three inches high, and many of them ten feet. I have found the transplanted trees to thrive the best. The ashes are many of them six feet four inches high; and they

they made by far the greatest shoots this year. About half of the Spanish chesnuts are in a thriving state, and almost all the elms. Half of the spruce firs have died, but the remainder have lately made great shoots, as have likewise about 2 or 300 oaks introduced in different places.

I am persuaded I may safely say, that there are at present no less than twelve acres of indifferent land in a fine growing state.

110 to 120,000		Larches,
6000	— ———	Ashes,
2400	— ———	Elms,
1000	— ———	Spruce Firs,
500	— ———	Spanish Chesnuts,
200	— ———	Oaks.

As I was induced to make this plantation in consequence of observing a growing scarcity of timber of all descriptions in this country, owing to a large consumption by several very extensive iron works, that have been erected within

within these fifteen or twenty years, I shall probably ere long plant the whole, or part of another tract of land (nearly fifty acres) which I have in an elevated situation, with Larches, where I have no doubt they will flourish, and become very valuable to my children, and to the public.

I will with pleasure send to the Society, any further information that may be required,

And have the honour to be,

&c. &c.

BENJAMIN WADDINGTON.

WE, whose names are hereunto subscribed, being inhabitants of Lanover, near Abergavenny, in the county of Monmouth, do hereby certify that the account of a plantation of Larches, Ashes, Elms, &c. made by Benjamin Waddington, Esq. which is annexed to this, and signed by him, is to the best of our knowledge and belief a fair and

and just one. Witness our hands this 24th day of December, 1802.

WILLM. POWELL, Churchwarden of Lanover.
PHILIP PREES, Overseer of the Poor of ditto.
WILLM. PREES, Constable of ditto.
JOHN SHARP, Gardener to Mr. Waddington.

The Thanks of the Society were this Session presented to THOMAS SKIP DYOT BUCKNALL, Esq. of Hampton-Court, for the following Communication on the Criterions or due Discriminations of Cyder Fruit.

SIR,

HEREWITH you receive a paper on the criterions or due discriminations by which the valuable cyder fruit may be ascertained, referring to my last and preceding Papers on Varieties.

Report says, cyders are not well produced out of the cyder countries. Were it said they are not well made, the assertion would be just; but it is a mistake to suppose that cyder cannot be made in perfection out of those situations. Only choose the proper soil for the fruit, see it ground down to a perfect smoothness, rind, pulp, ker-

nels and all; duly fermented.—Tun the liquor at the exact point of time with regard to settling, which is well understood in the West, and not attended to elsewhere; and do not rack it too much. Keep the liquor in quantity to a good age; and I take the liberty of maintaining, that there are places in Hertfordshire capable of producing as good and fine cyder as any in Herefordshire.

I was once asked what are the impediments to a more general fine crop of fruit? My reply was, the coldness and uncertainty of the climate, injudicious planting, with inattention and neglect in those who have the management of it. As for planting and guarding against cold, enough has been said on that subject through the whole of my treatises. It has been observed the cyders were better one hundred years ago than they are now. That may have been the case; and I should account for the difference as follows:

follows:—When the gentry and superior yeomanry of the country depended on barley and fruits to make an agreeable beverage for their friends, it is natural to suppose that they personally superintended the business themselves, and received great satisfaction when their labours were attended with success; whereas, when Port wines became the luxury of the country, cyder, of course, naturally fell into disuse at the better tables. Hence the masters of families were no longer zealous to produce fine potent liquor, and giving it as cyder, that being assigned to inferior uses.

Undoubtedly, where cyder is the general drink of the country, great quantities must be raised for that purpose; and it is done at so low and easy a rate, as to be sent from the mill to the neighbours cellars under three halfpence the gallon. What I am attempting is, to be able to produce, *at*

a certainty, a fine generous liquor, such as may do credit to the name of the cyderist, and which will depend much more upon attention than is generally imagined.

After having expatiated on the old and new varieties of the valuable cyder fruits, in the last volume of the Society's Transactions, I have nothing farther to offer for the purpose of closing the Orchardist, than to present my best respects to the Society, and give them the marked criterions as follows:—

My friend, Thomas Andrew Knight, Esq. has made good discriminations in his Tract on the Apple and Pear. The Somerset report has further extended the subject.

I say, choose an apple naturally small, of a whitish colour, somewhat tinged with red; of a fine yellow pulp, with a certain degree of astringency, and as much saccharine matter as nature is disposed to produce; then observe if the cells are large, and full of

of ripe kernels; and further still, know whether the blossoms are patient of cold, and the fruit ripens well.

Such an apple, particularly if a new variety, properly ground down and duly fermented, must make good cyder; and both as to profit and use, be valuable in any neighbourhood, or as an article of trade. The foundation is now so well laid, in the seedling beds in the County of Hereford, that within five years there will be more than one hundred new valuable varieties produced. I last autumn saw two most beautiful new apples, of the first year's growth, upon the Grange estate, and which decidedly obtained the Hereford premium: they were seedlings of high promise. There is an emulation among gentlemen of that part of the country, which does them great credit.

Dr. Symonds gives several of these discriminations; and in addition says:—The flavour of a good cyder-fruit

cannot be mistaken by a man conversant with apples, though difficult to be described; but above all, he recommends to choose apples, the rinds of which have follicles, or cells, containing large quantities of essential oil, more particularly to be noticed in the old stire, golden pippin, and pauson, and from which Dr. Symonds conceives the cyder in a great measure derives its flavour. It is to be observed, that the old pauson, woodcock, and red musk, are generally large apples. The old scorched-harvey is an exception as to the yellow colour; that being white, with a brown skin. There are other exceptions; but the material criterions are here enumerated according to the received opinion.

Had I formed these distinctions when I was a boy, I should then have said, take any apple bordering on the golden rennet or golden russet, and it will make good cyder, in consequence of supposing that the golden colour is

of

of service. We had a fine apple, the royal pearmain; it was more flat and large than the Seville orange; it had a thin skin and quick taste, with much sweetness, and made fine cyder: but I presume that variety is now over, as I have not seen one of them for many years.

In the October of 1801, which I spent in Kent, I was shown a new apple. The tree is handsome, and the fruit has most of the criterions, but does not ripen well, which is a great defect in cyder-making; we named it *The Bland of Hartlip.* It has the macula, or follicles in the skin, more visible than on the golden pippin. I intend examining it with attention at a future period, as it is not possible to form a certain judgment on it for some years. My reason for mentioning the Bland of Hartlip is, to prove that the idea of searching after new varieties has

made a general impression throughout the kingdom.

It was the custom formerly, if a new apple had many good points, but ripened late, to preserve the tree as a new variety, imagining that, as it advanced in age and acquired strength, the fruit would ripen the sooner, and consequently the cyder be richer. I should add to it, lay the land dry, and spread plenty of manure. These attentions would much accelerate the wished-for object of improving the liquor, as well as increasing the quantity of fruit.

I remain,

DEAR SIR,

Your obedient Servant,

THO. SKIP DYOT BUCKNALL.

Hampton-Court, Nov. 14, 1802.

Mr. CHARLES TAYLOR.

The

The SILVER MEDAL of the Society was this Session voted to Mr. DAVID CHARLES, of Westmead Langhorne, in Carmarthenshire, for a MACHINE for laying the uneven Surface of Land level; and the Thanks of the Society were presented to Lieut. Col. HARDY, for a MODEL of the MACHINE, and the following Communication upon the subject.

A DRAWING and DESCRIPTION of the MACHINE are annexed, and the MODEL is placed in the Repository of the Society.

SIR,

EVERY new invention that lessens the expense of manual labour must become an object to your Society; I therefore beg leave to inclose the plan of an instrument for levelling ground,

ground, used by me this last season. Its application is simple, and its success so evident, that two neighbouring farmers borrowed it, and used it in the same manner.

Should the Society consider it worth adopting, and that the sketch accompanying this letter is not sufficiently clear, I shall with great pleasure send a model to their Repository.

I have the honour to be

Your most obedient Servant,

JOSEPH HARDY.

Westmead Langhorne, Carmarthenshire, Jan. 5, 1803.

Mr. CHARLES TAYLOR.

An

An Explanation of the Uses, Application, and Effects of a LEVELLER, *a Plan of which is annexed, from Lieut. Col.* HARDY, *of Westmead, Carmarthenshire.*

THIS simple machine, which is the invention of my Steward, and of which I have seen nothing similar, appears to me necessary, even in the most fertile parts of England, where the new system of drill-husbandry has been introduced, or even where there is any attention to the waste of time, or to the ease of cattle in the act of ploughing; in order to get rid of crooked or unequal ridges, without either a summer fallow by cross ploughing, or else by frequent repetitions of ploughing in the winter and spring, which the humidity of our climate will not allow in every kind of soil.

I reduced fourteen acres of land last spring to a perfect level, where the crowns

crowns of the ridges were above two feet higher than the furrows, and where they were crooked and of unequal breadths. Six acres of this is now under turnips, a crop that gives sufficient time to ameliorate the under-strata of soil that had perhaps never before been exposed to the influence of the sun and air; and by the adoption of the Northumberland mode of sowing that root on dunged drills, it is almost immaterial where the upper strata is, provided the seed vegetates, as it soon strikes into the manure, and rapidly flourishes.

My chief success, however, has been upon a field of eight acres, which lay in the unprofitable state already described. This land, which is a deep clay, and which had produced a crop of wheat from an old lay sod the former year without any manure, was winter ploughed, and lay in that state until the leveller was introduced the first dry weather in April. It was preceded by two horse-ploughs, taking perhaps a square

square of an acre at once: these loosened the soil the depth of a common furrow, and twice the breadth across the ridges. The leveller followed, drawn by two oxen and two horses, with a man at each handle, to press it down where the height is to be removed, and to lift up the body by the handles where it is to be discharged. Thus four men, one driver, and eight head of cattle, will more effectually level from half an acre to three roods in one day, according as the earth is light or heavy, than sixty or eighty men would accomplish with barrows and shovels, &c. even with the assistance of a plough. In sandy ground where the depth of one furrow will bring all to a level, as much will of course be done in one day as two ploughs can cover; but my ground required to be gone over several times. After this field was levelled, the backs of the ridges, as they are termed, which were stripped of their vegetable mold,

mold, were ploughed up, the furrows not requiring it. They were also harrowed, and the field copiously manured with lime compost; harrowed in, and broke into nine-feet ridges, perfectly strait, in order to introduce Duckit's drill. It was sown under furrow, broadcast, the last of it not until the 13th of May, and was cut down a reasonable crop the 4th of September. I am now thrashing it, and a sample shall be sent, as well as a return of the eight acres if necessary.

The field now lies in proper form, well manured, with the advantage of a fair crop from heavy tenacious ground, without losing a season, and in a year by no means favourable.

I am well aware there are many shallow soils, where it may be hazardous to remove the enriched surface, and trust perhaps one half of your land for a crop that had never before been exposed to the atmosphere; but where the

the soil is sufficiently deep, or you have good under-strata, and there is manure at hand to correct what is sour from want of exposure and tillage, it is evident from this experiment that no risk is run.

To avoid the expense of a fallow, and to lay out ground in strait and even ridges, even where drill husbandry is not practised, should be objects to every rational farmer. But where the new system is intended to be adopted, it becomes indispensably necessary. In laying down lawns, parks, &c. where furrows are an eyesore, or places inaccessible to wheel carriages from their declivity, and from which earth is to be removed, it will be found equally useful.

Should the Society consider the inventor, David Charles, worthy of any remuneration, honorary or otherwise, it will be gratefully acknowledged by

Your obedient Servant,

JOSEPH HARDY.

Westmead, Jan. 1, 1803.

Mr. CHARLES TAYLOR.

Certificates from Mr. Owen Edwards, of Brook, and Thomas Bynan, carpenter, of Westmead, accompanied the above letter, confirming the statement made therein.

DESCRIPTION

Mr. David Charles's Machine, for laying Land level.

Fig. 2.

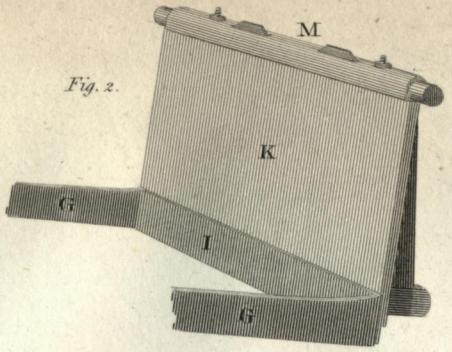
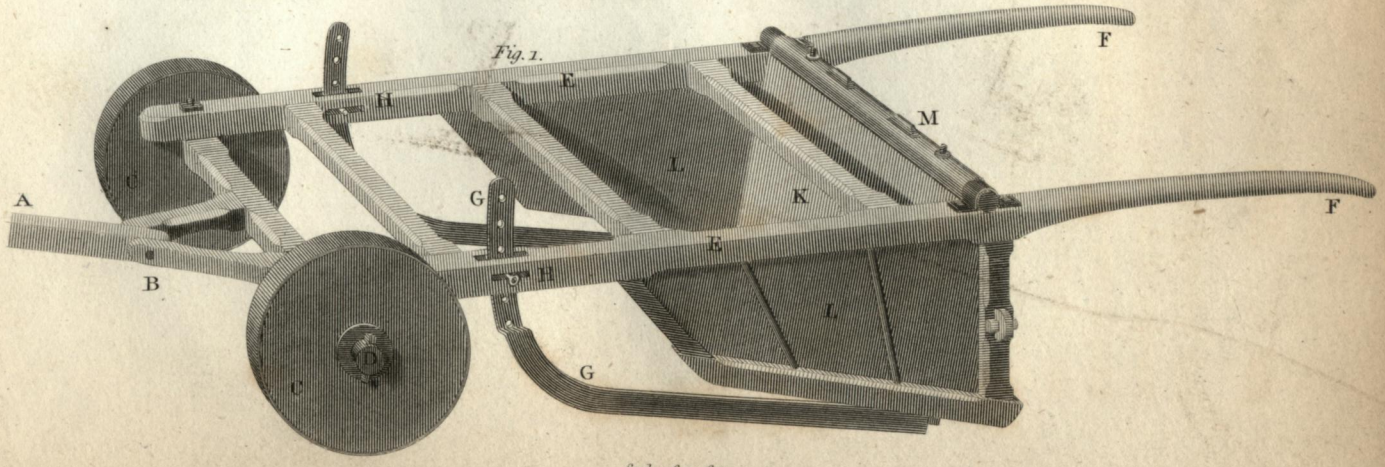


Fig. 1.



Scale of 20 feet.

Lowry sc

DESCRIPTION *of the* MACHINE *for laying* UNEVEN LAND *level, invented by* Mr. DAVID CHARLES.—*Plate IV, Fig.* 1, 2.

Fig. 1.—A, Part of the pole to which the oxen or horses which draw the machine are fastened, and which is attached to the machine by a pin at B.

C C, The two wheels, shod with iron, which run upon the axle D.

E E, The upper frame-work of the machine, extending from the axle to the extremity of the handles FF, and secured firmly by the cross pieces.

G G, The curved iron sliders of the machine, which may be raised or depressed a little by means of the pins H H, which pass through holes in the wood-work, and also in the iron sliders; these sliders form one piece with the back iron scraper I, in

the manner more fully explained in Fig. 2.

K, The wooden back of the machine, which should be made strong, to resist the weight of the earth when collected therein. The iron scraper should be firmly secured to this by screws and iron-work.

L L, The wooden sides of the machine firmly connected with the back and frame-work, in order to assist in collecting the earth to be removed.

M, A strong cross piece into which the ribs which support the back are well morticed.

Fig. 2.—K, The interior part of the back of the machine.

I, The iron scraper, sharp at the bottom, and firmly screwed to the back of the machine.

G G, Parts of the side irons or sliders, showing the mode in which they are united with the scraper I.

M, The cross piece above described.